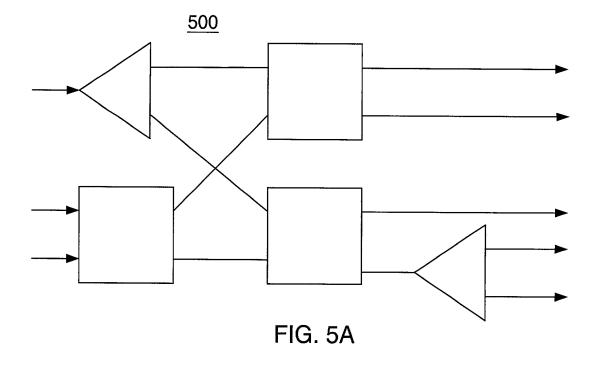
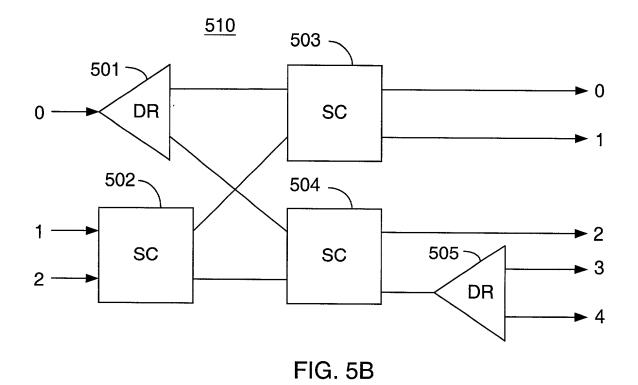


FIG. 4





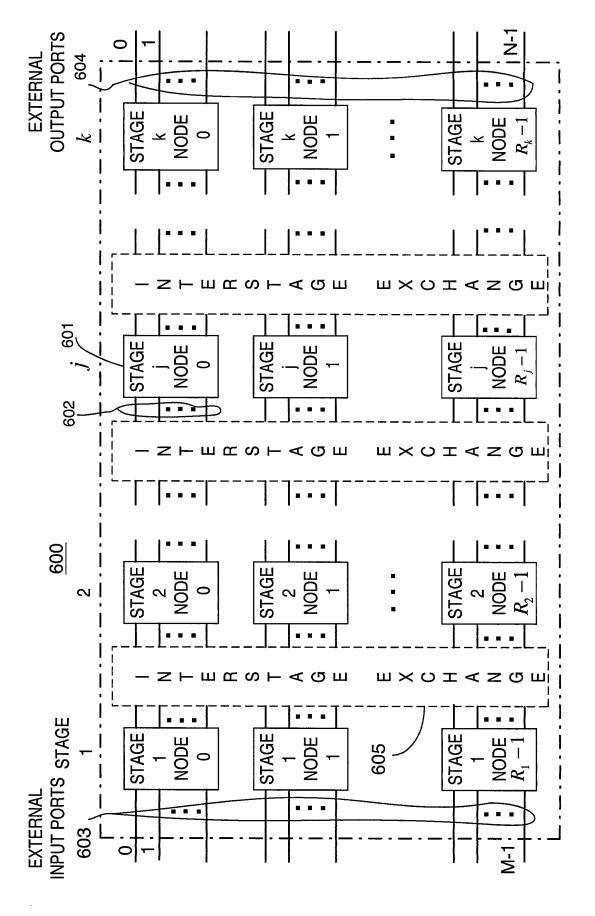
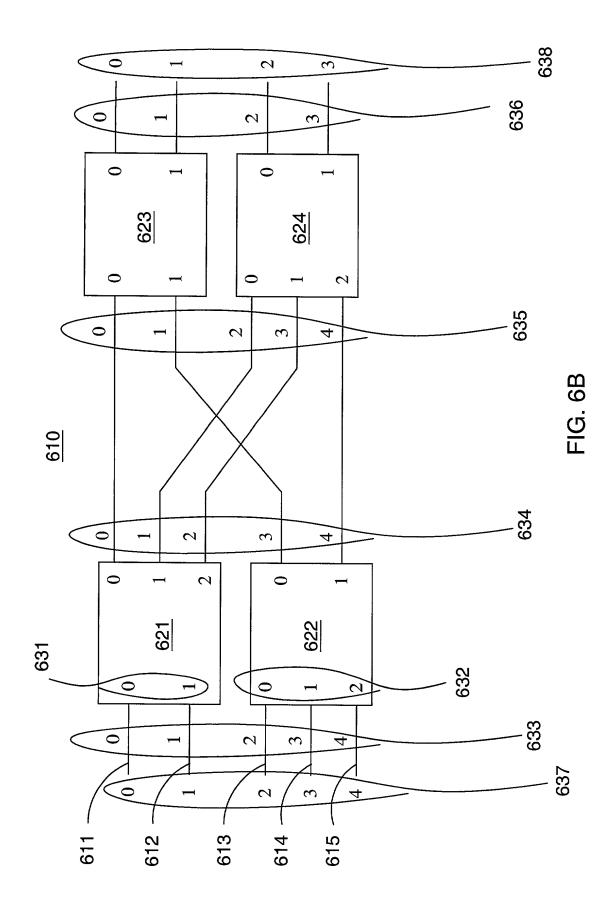
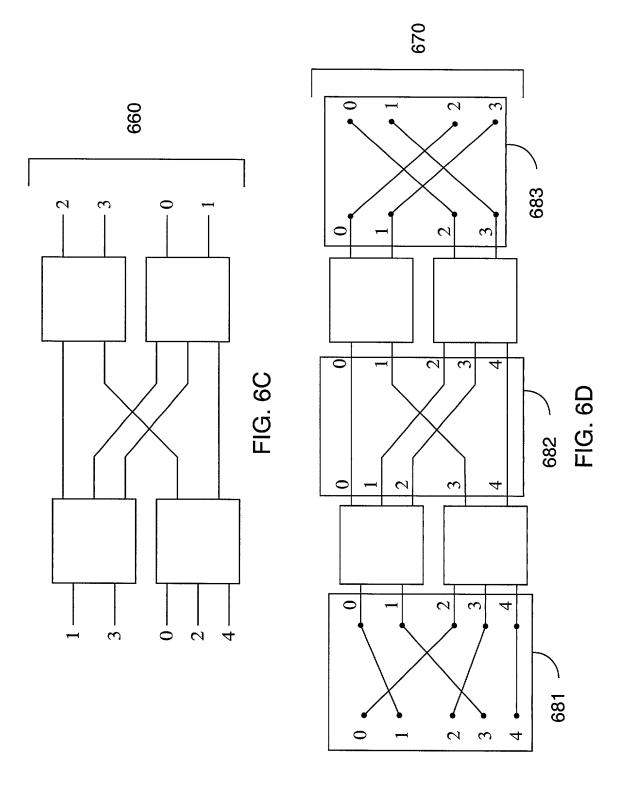
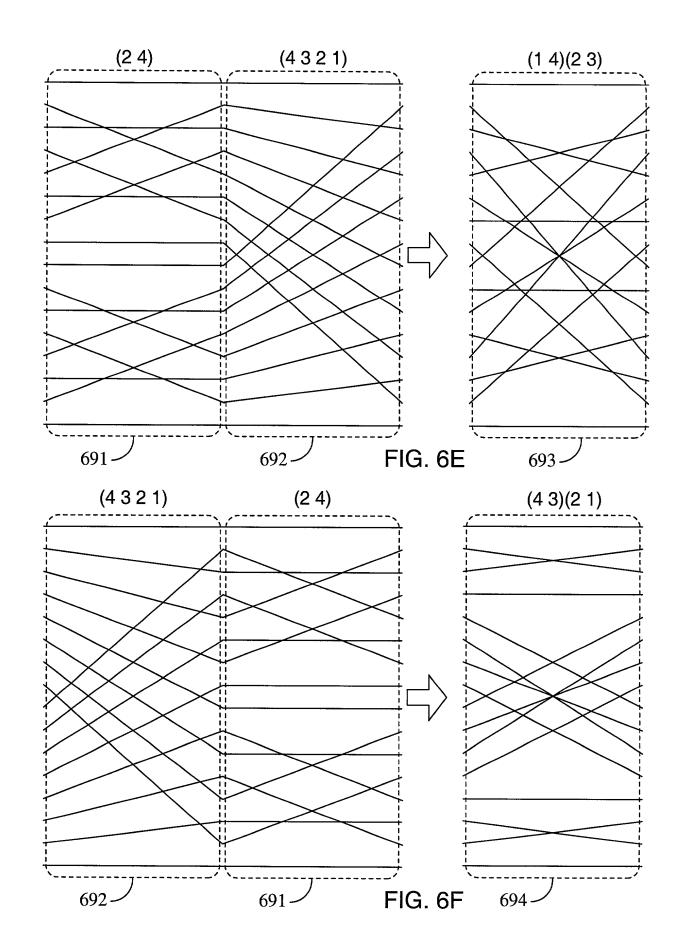
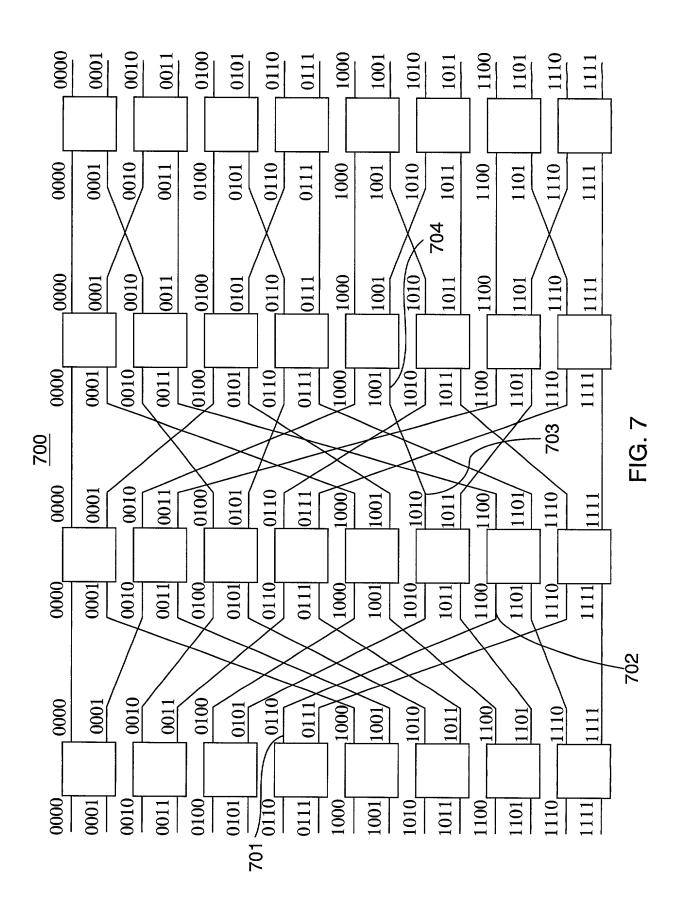


FIG. 6A

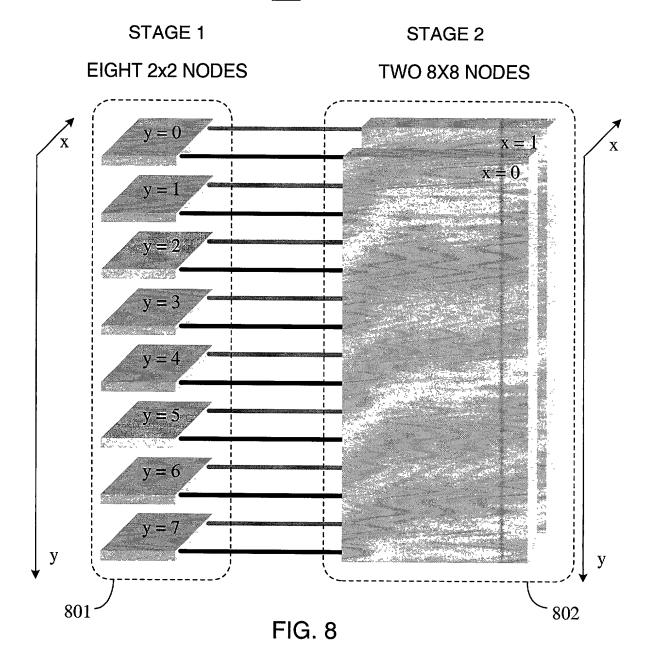


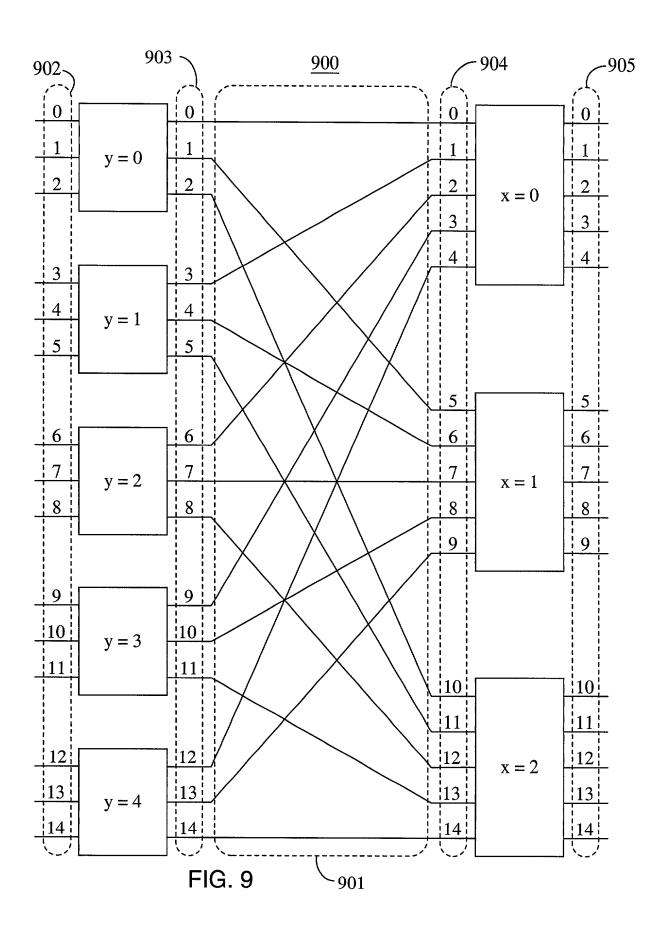


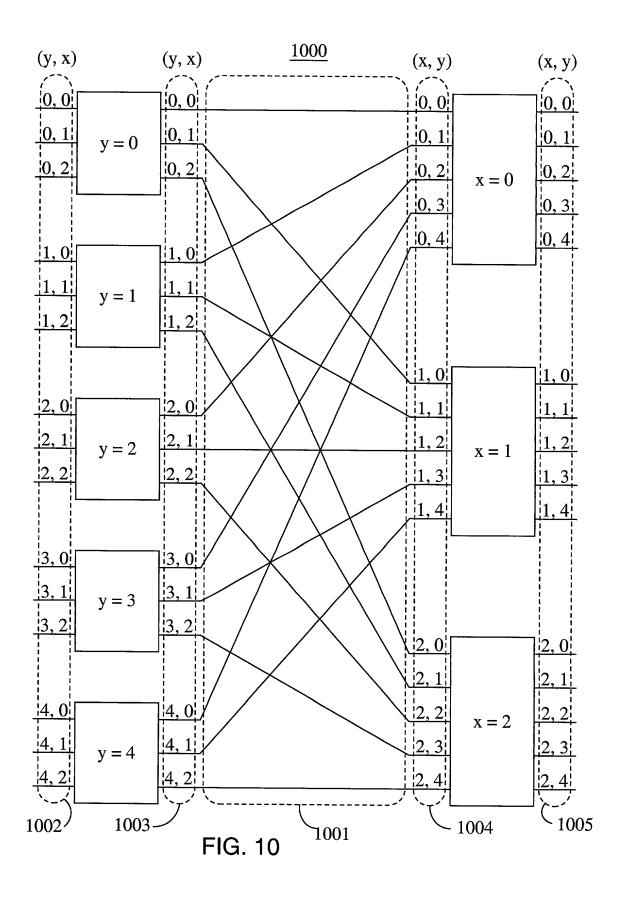


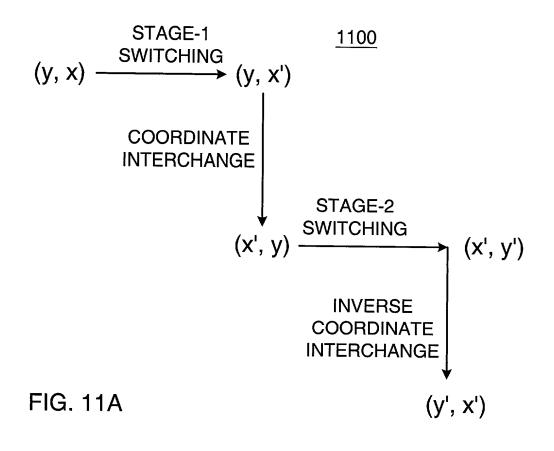


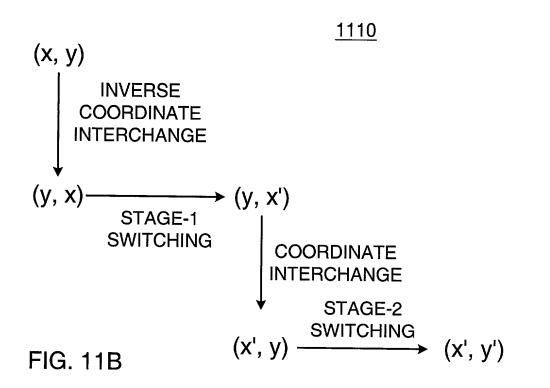
<u>800</u>

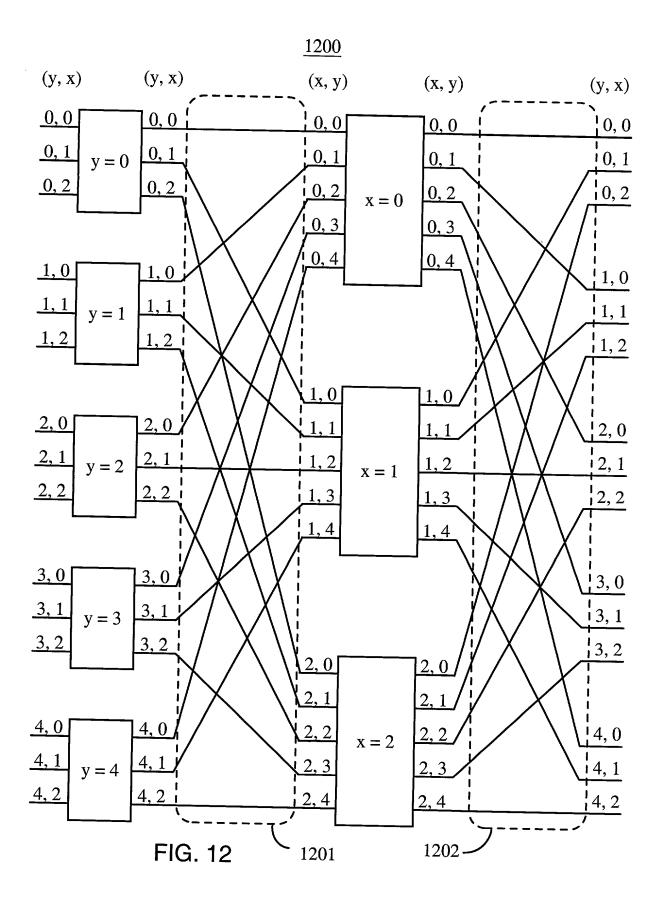


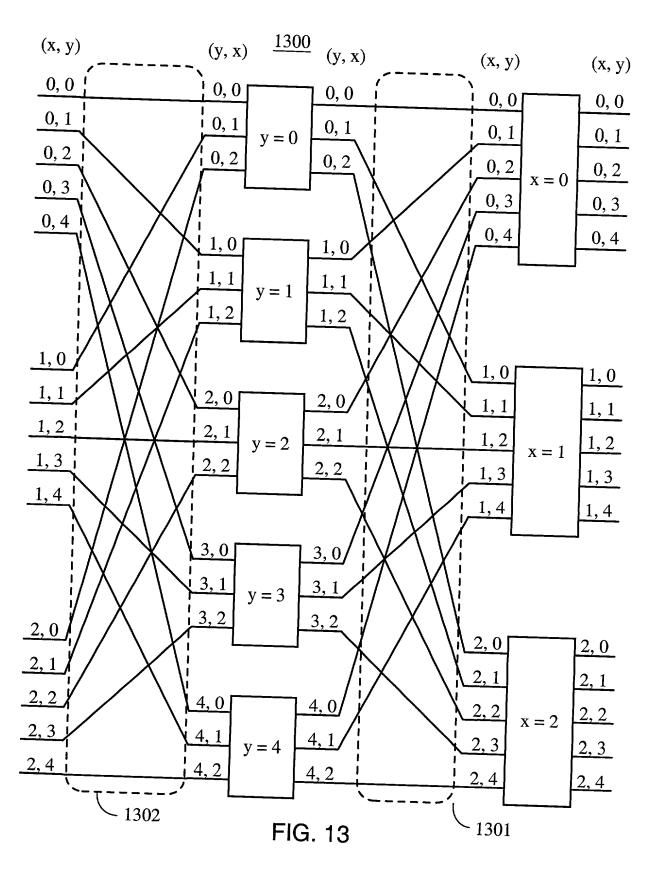


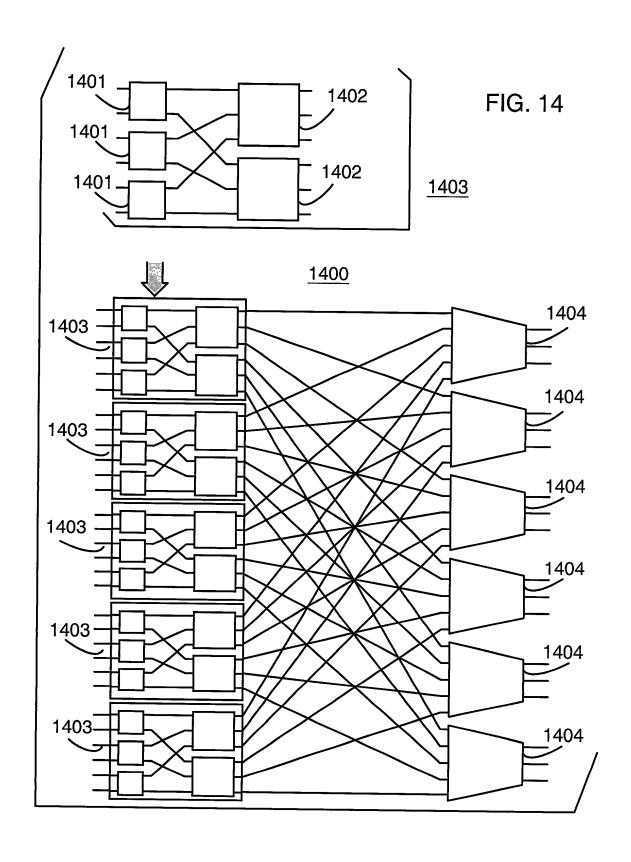












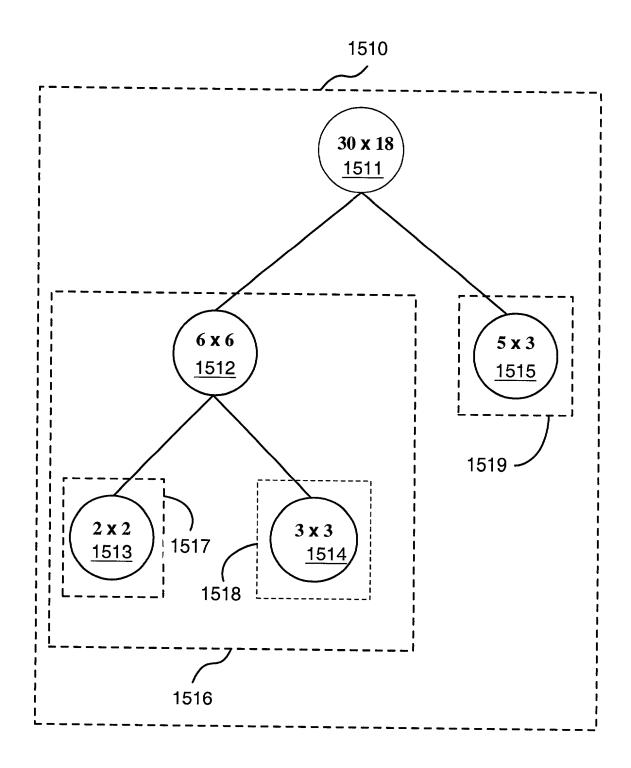
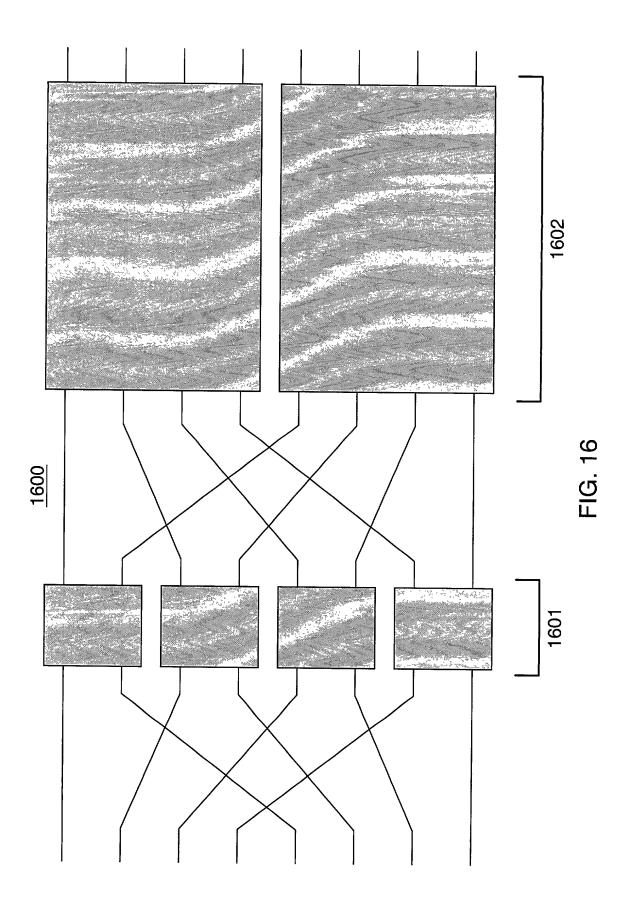
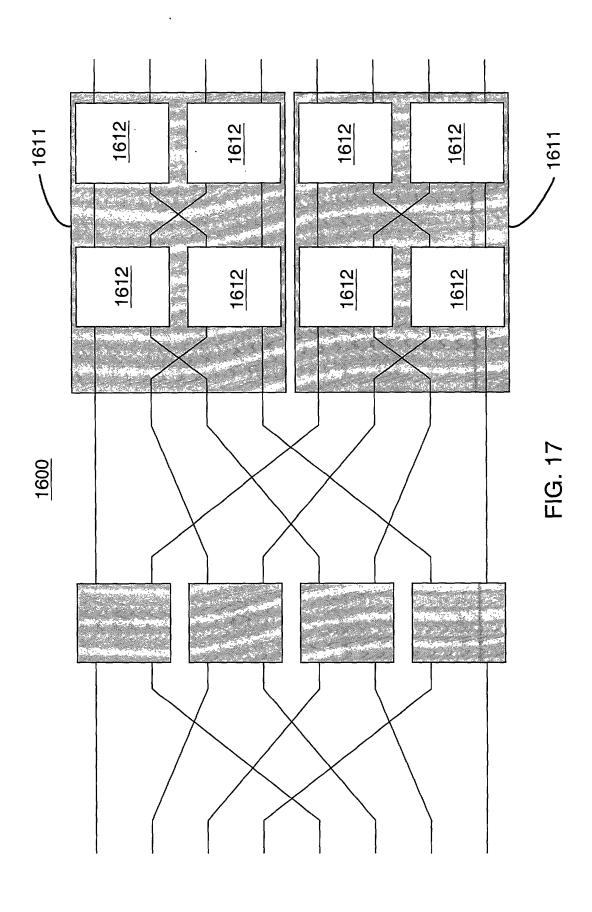
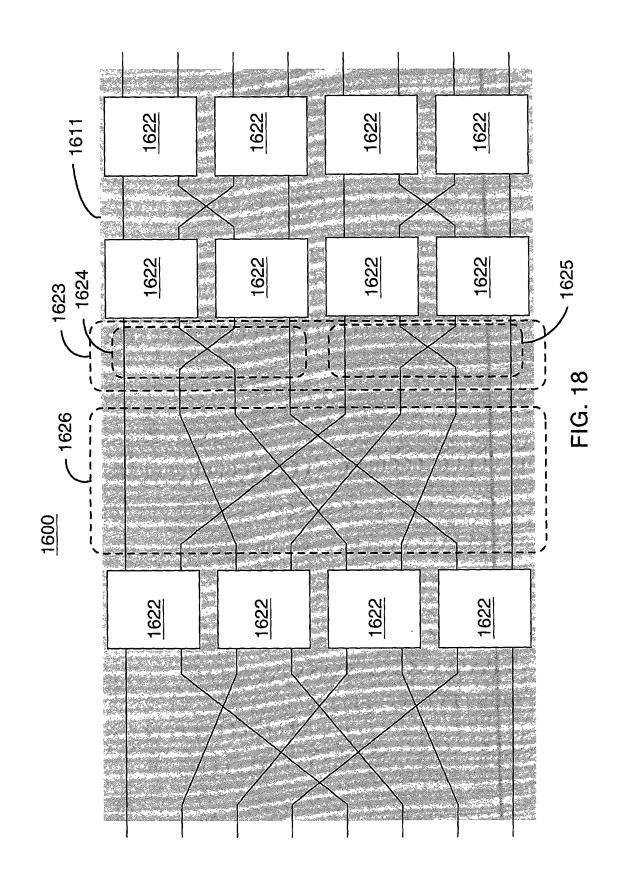


FIG. 15







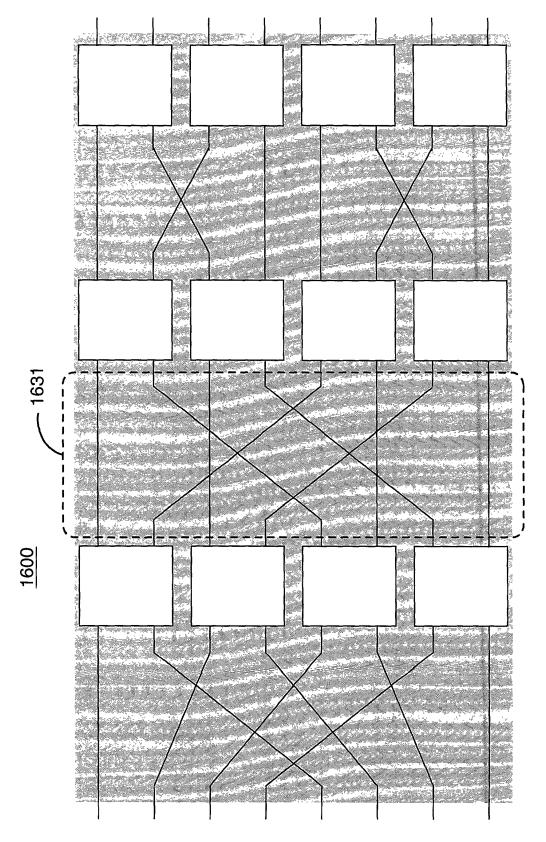


FIG. 19

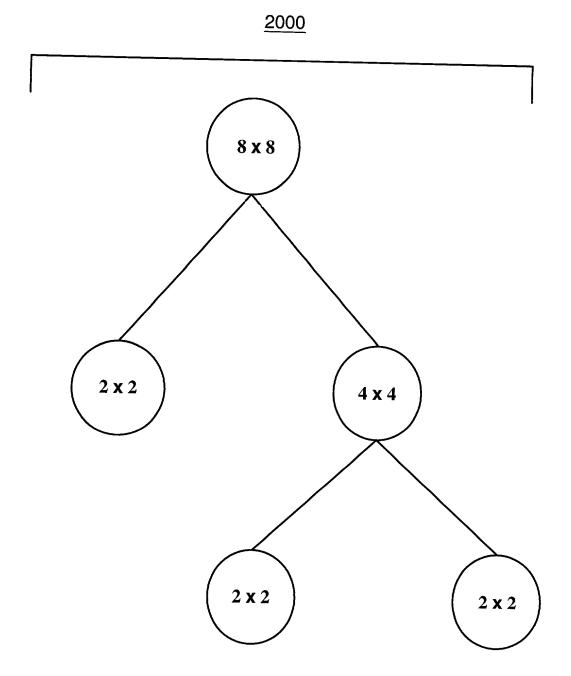


FIG. 20

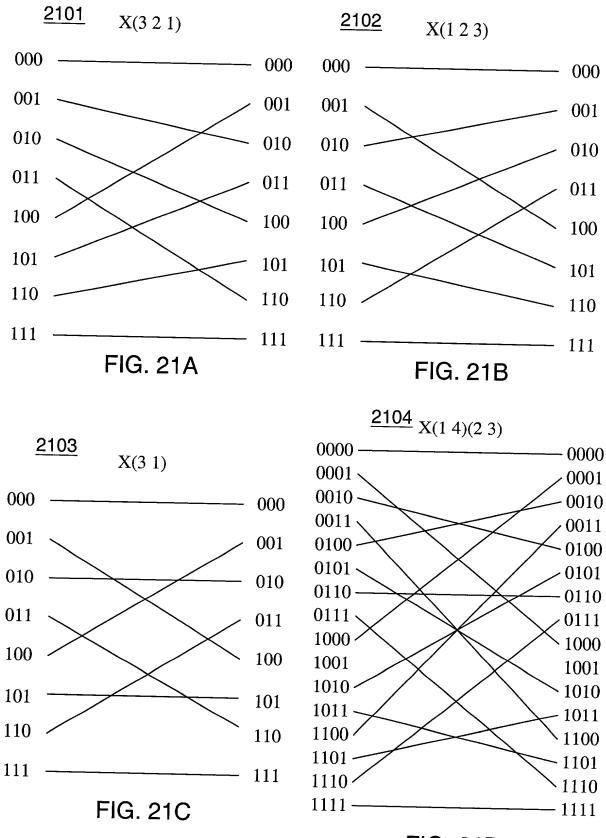
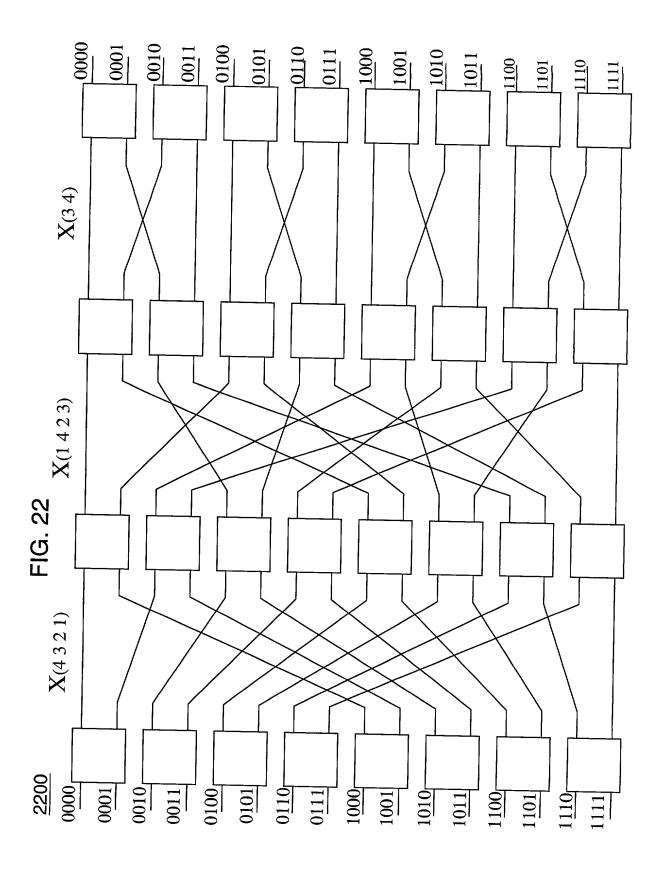
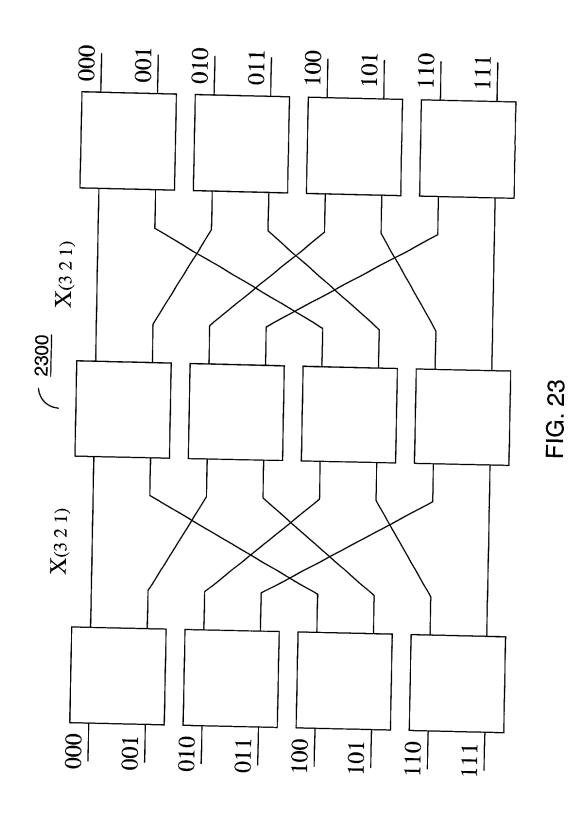


FIG. 21D





<u>2400</u>

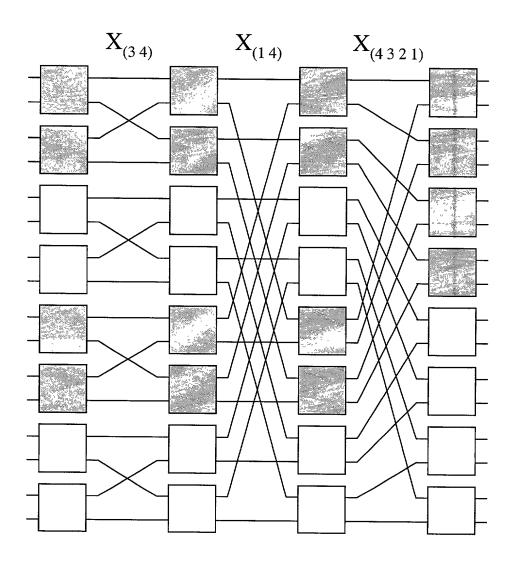
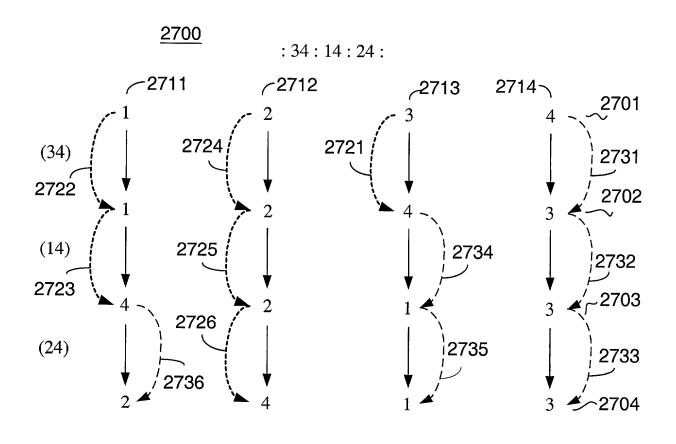


FIG. 24



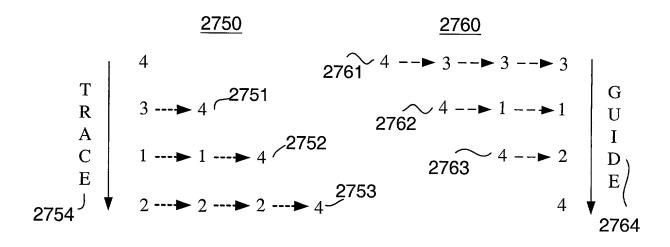


FIG. 27

Trace
$$\begin{pmatrix} 4321 \end{pmatrix} : (14) : (24) : (34) : \\ 1 & \longrightarrow & 4 \\ 2 & \longrightarrow & 1 & \longrightarrow & 4 \\ 3 & \longrightarrow & 2 & \longrightarrow & 2 & \longrightarrow & 4 \\ 4 & \longrightarrow & 3 & \longrightarrow & 3 & \longrightarrow & 4$$

FIG. 28A

$$(4321) : (14) : (24) : (34) :$$

$$4 \rightarrow 1 \rightarrow 1 \rightarrow 1$$

$$4 \rightarrow 2 \rightarrow 2$$

$$4 \rightarrow 3$$

$$4 \rightarrow 3$$

$$4 \rightarrow 4$$
Guide

FIG. 28B

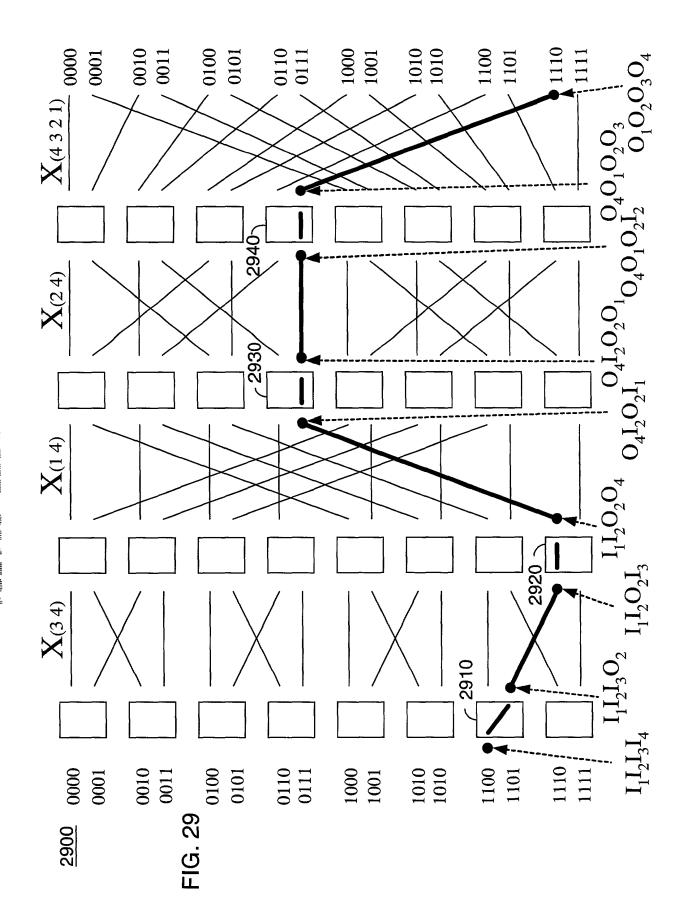
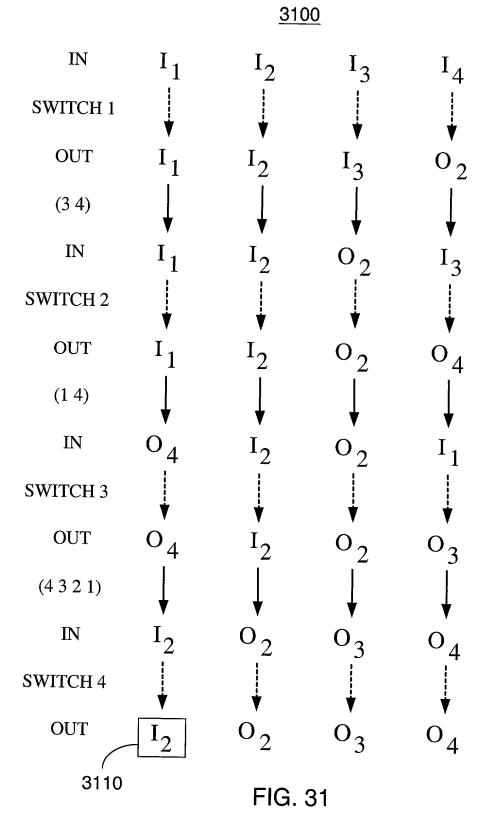


FIG. 30A

FIG. 30B



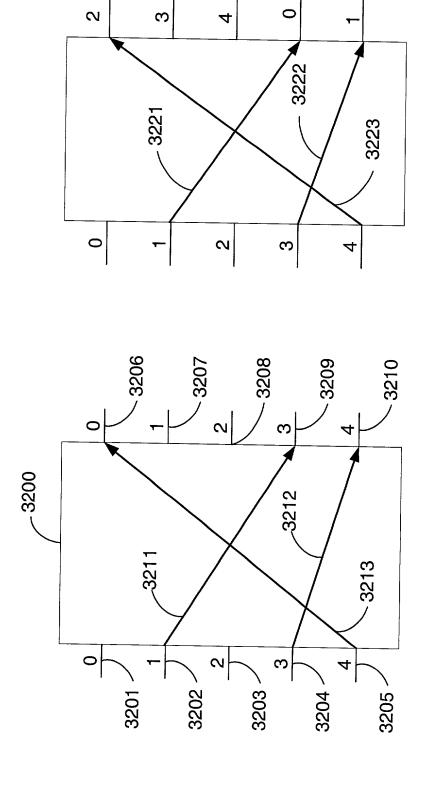
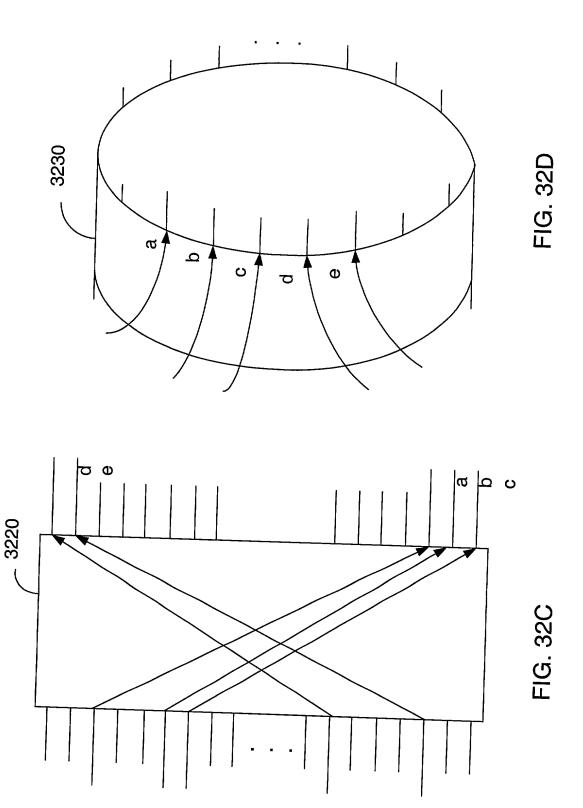
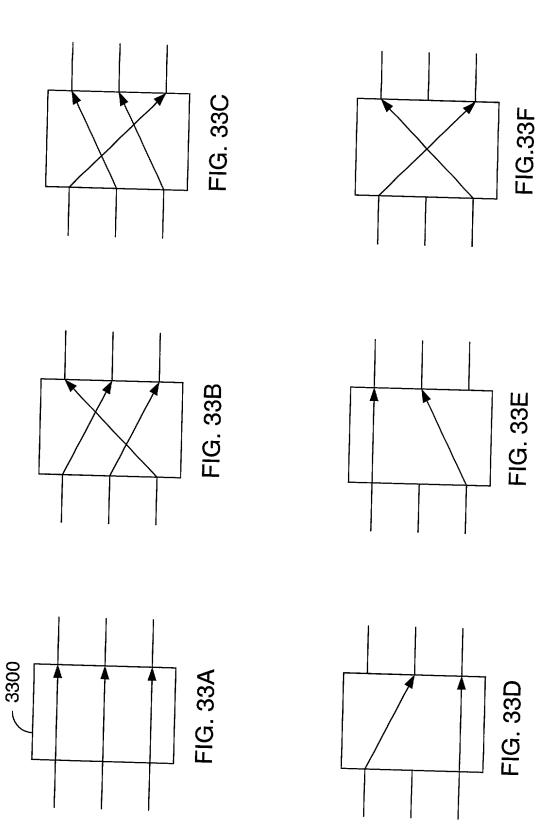


FIG. 32B

FIG. 32A





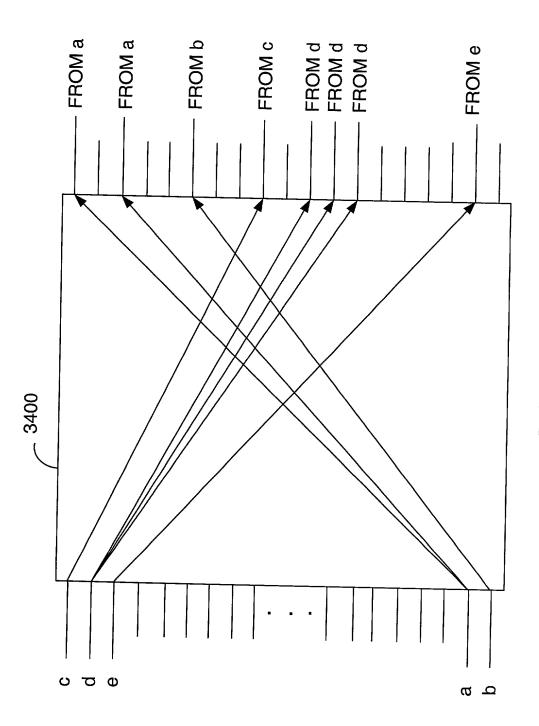
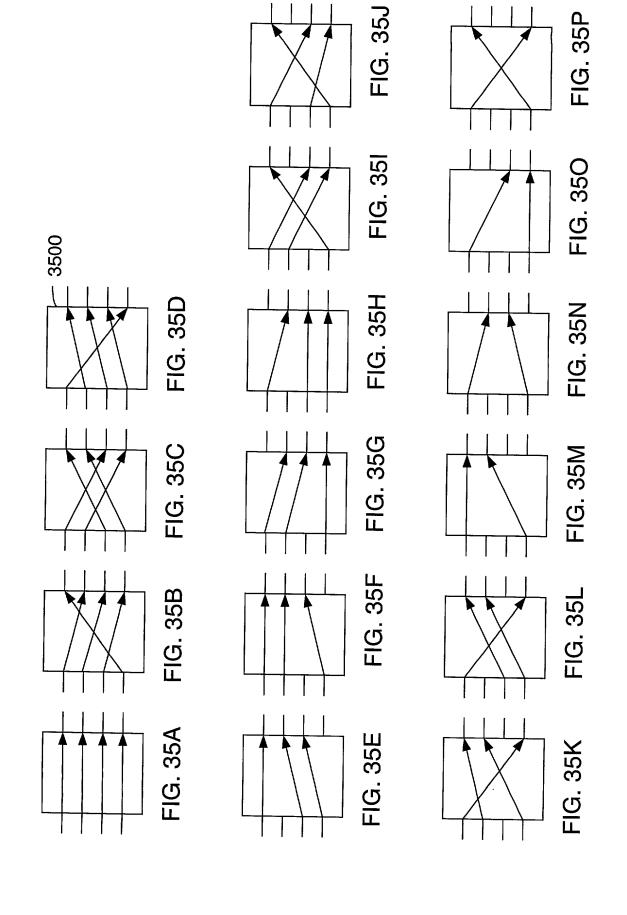
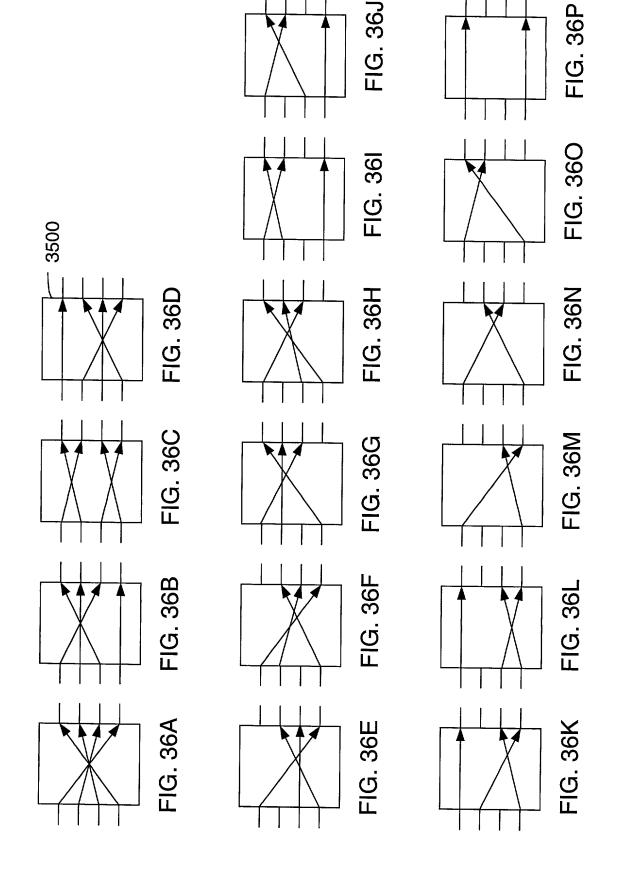
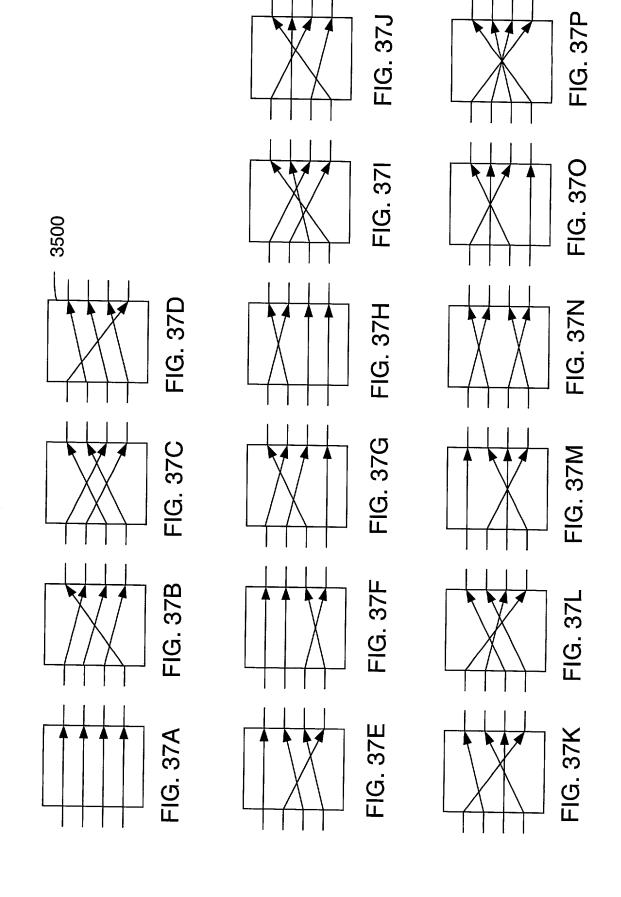


FIG. 34







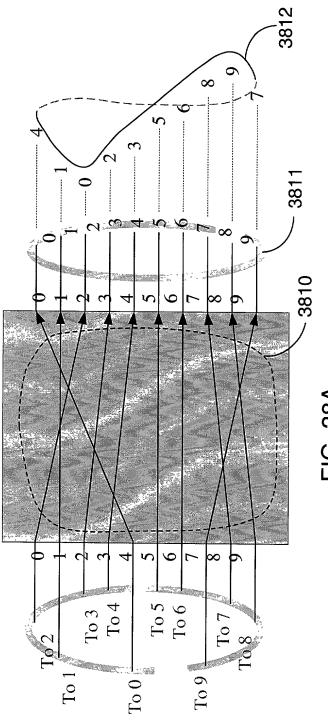
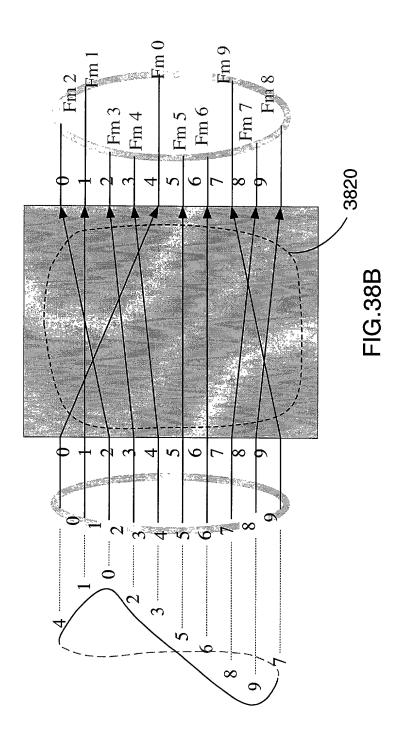


FIG. 38A



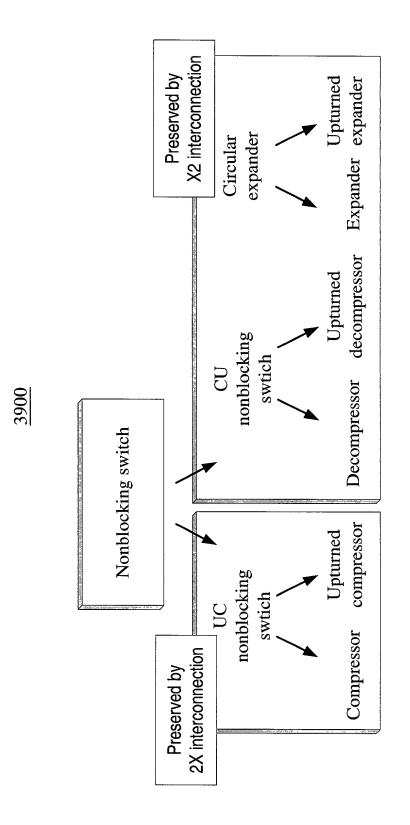
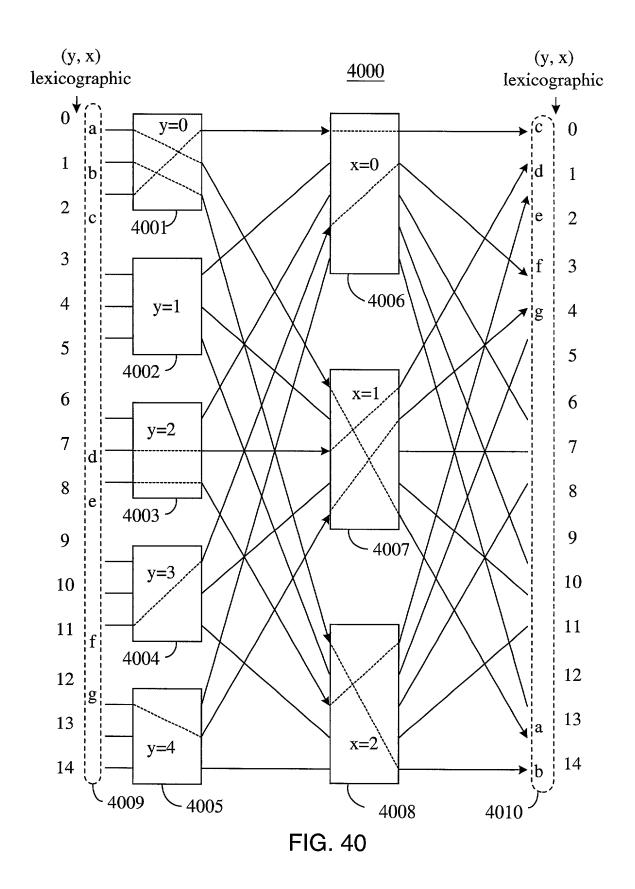


FIG. 39



4100

Preservation of the (1) compressor, (2) upturned compressor and (3) UC nonblocking properties of a switch

Recursive 2X constructions from arbitrary building blocks

Recursive 2X constructions from cells

Banyan-type networks with monotonically decreasing trace and guide

<u>4110</u>

Preservation of the (4) decompressor,

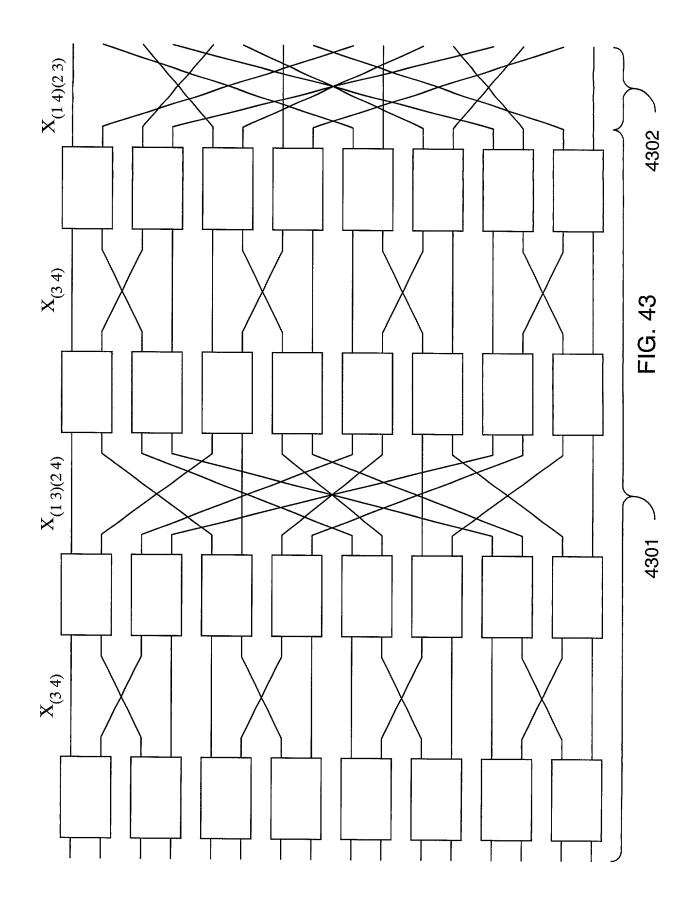
- (5) upturned decompressor,
 - (6) CU nonblocking, (7) expander,
 - (8) upturned expander and
 - (9) circular expander properties of a switch

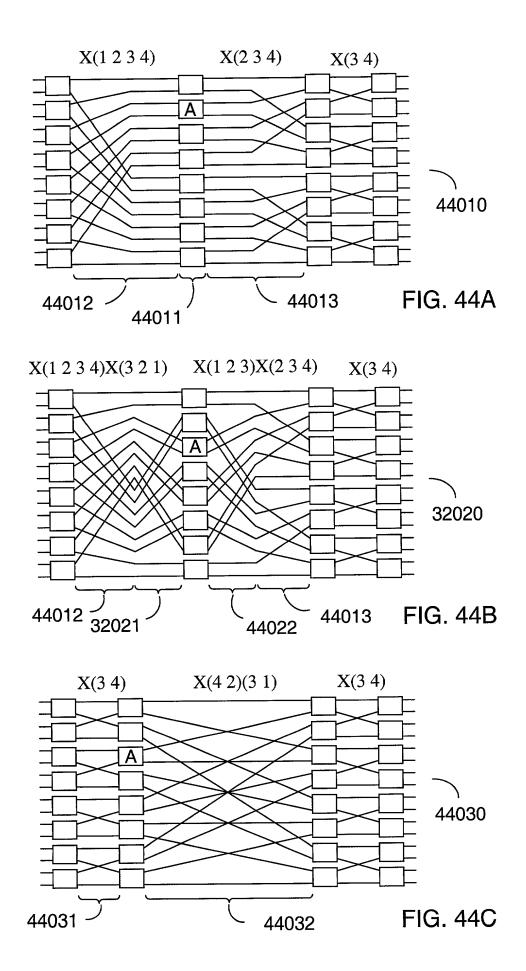
Recursive X2 constructions from arbitrary building blocks

Recursive X2 constructions from cells

Banyan-type networks with monotonically increasing trace and guide

FIG. 41





Equivalence banyan-type in stronger networks among sense match of output exchange only (<==> common guide among Equivalence requiring the the networks) (<==> common trace and guide Equivalence without requiring the match of I/O exchanges Equivalence requiring the match of I/O exchanges among the networks) (unconditional) match of input exchange only (<==> common trace among Equivalence requiring the the networks) 4500

FIG. 45

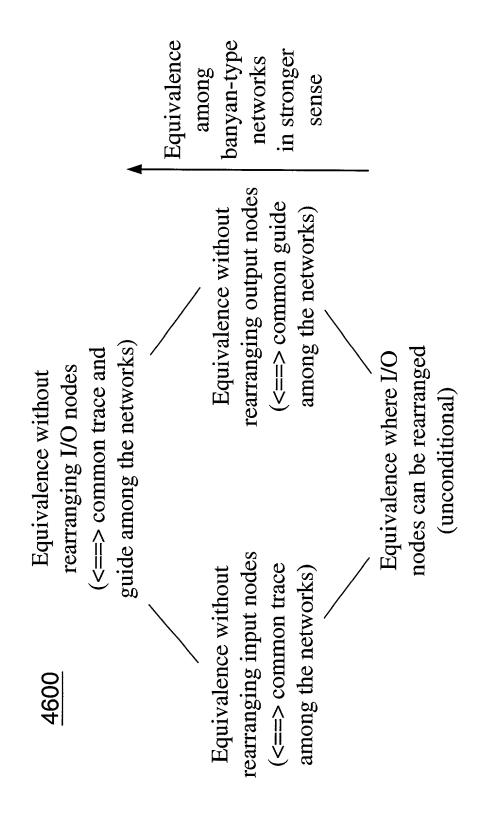


FIG. 46

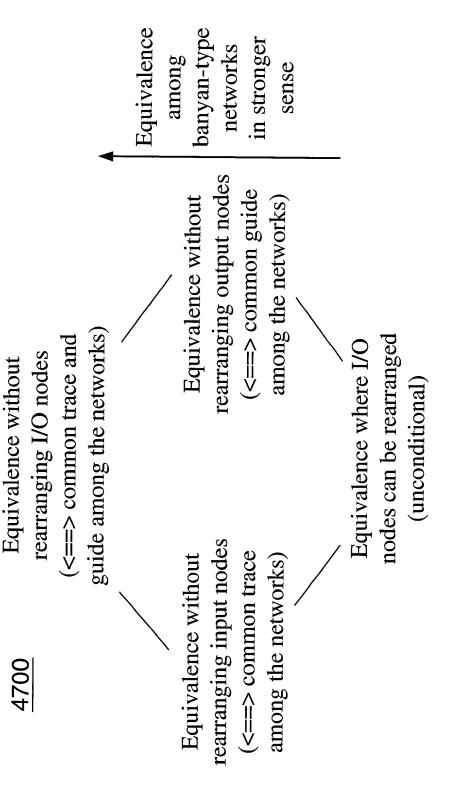


FIG. 47

4800

Equivalence without rearranging I/O nodes (<==> common trace and

guide among the networks)

Equivalence without rearranging input nodes (<==> common trace among the networks)

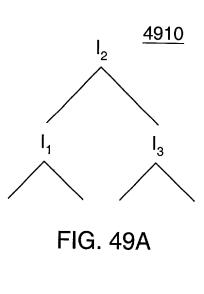
Equivalence without rearranging output nodes (<==> common guide among the networks)

Equivalence where I/O nodes can be

rearranged
(<==> trace and guide of one network can be
repsectively changed to that of the other
network by a permutation)

FIG. 48

Equivalence among bitpermuting networks in stronger sense



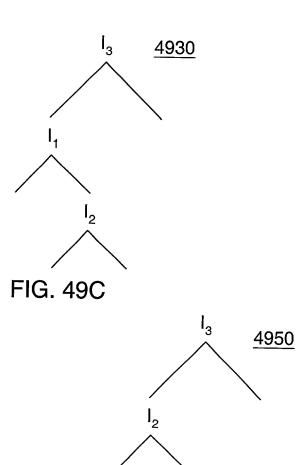
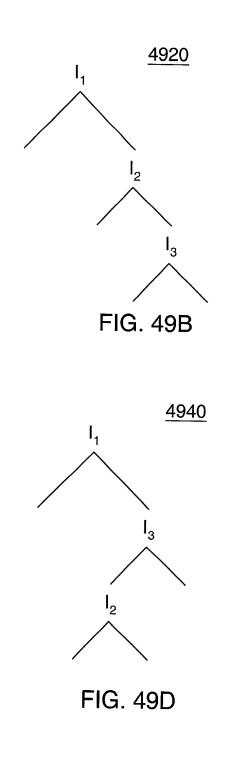
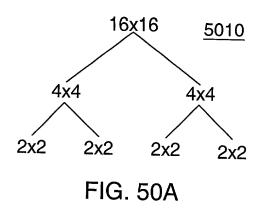
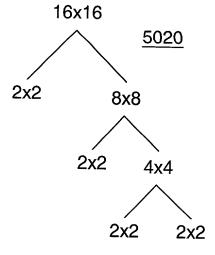


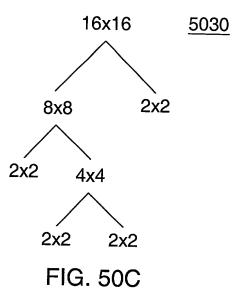
FIG. 49E

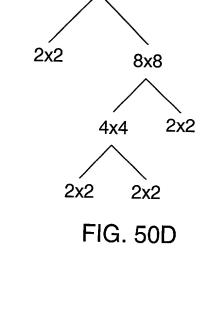






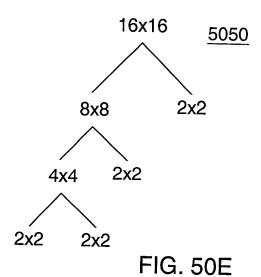






16x16

<u>5040</u>



<u>5100</u>

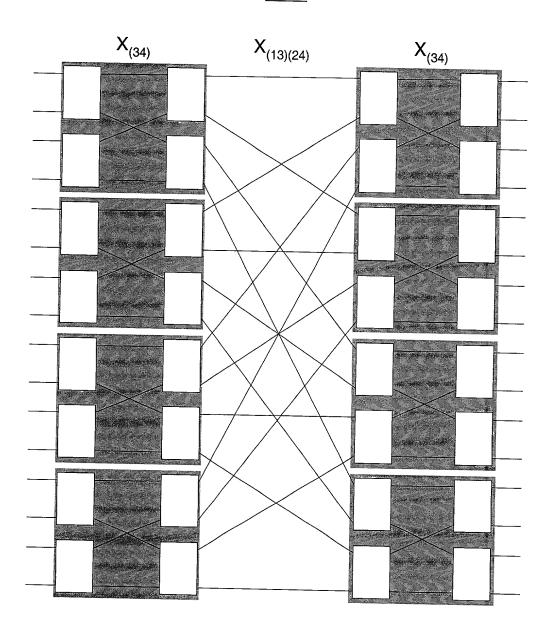


FIG. 51

<u>5200</u>

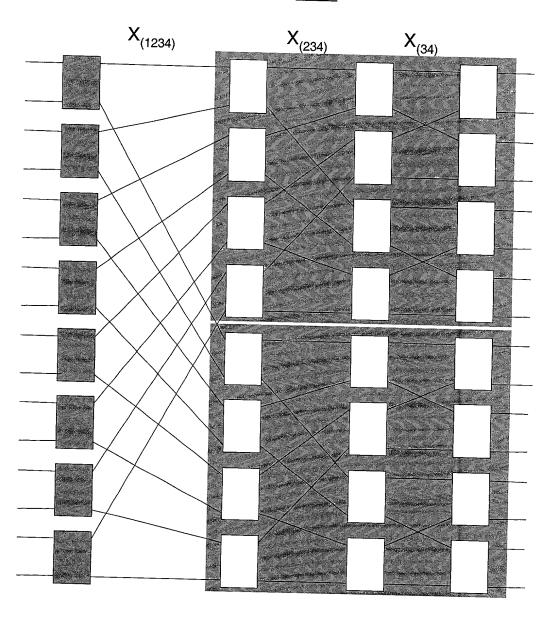
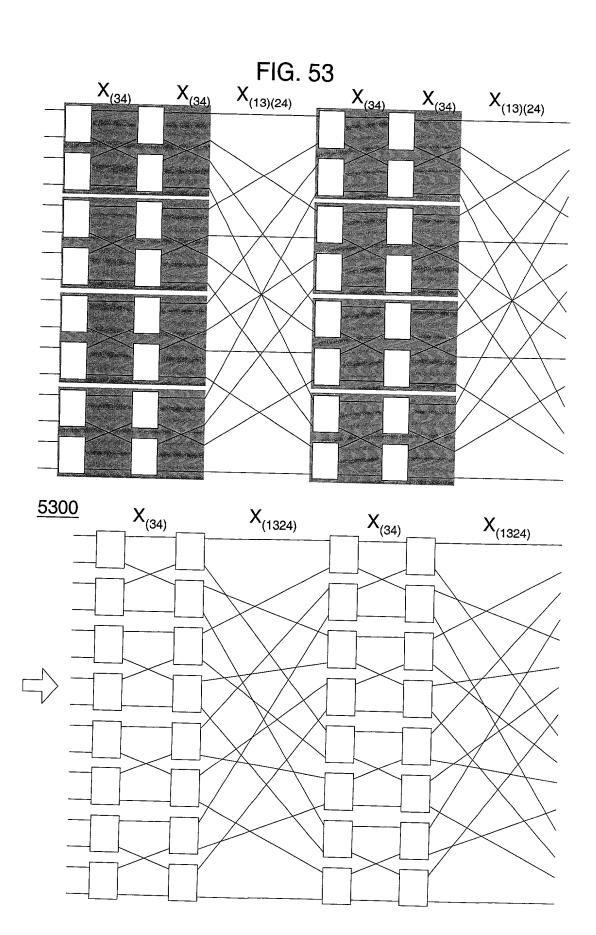


FIG. 52



<u>5400</u>

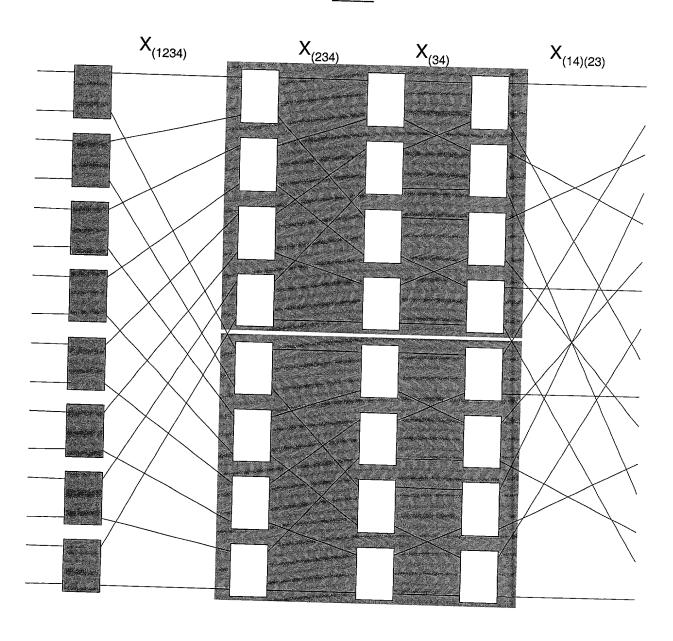


FIG. 54

<u>5500</u>

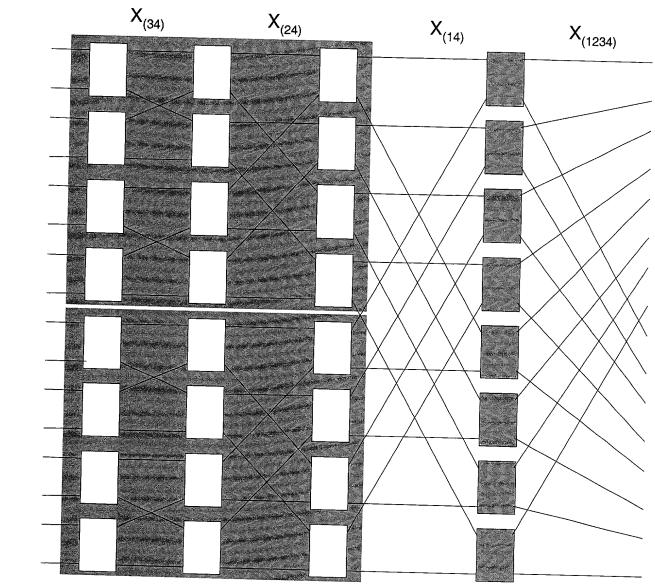
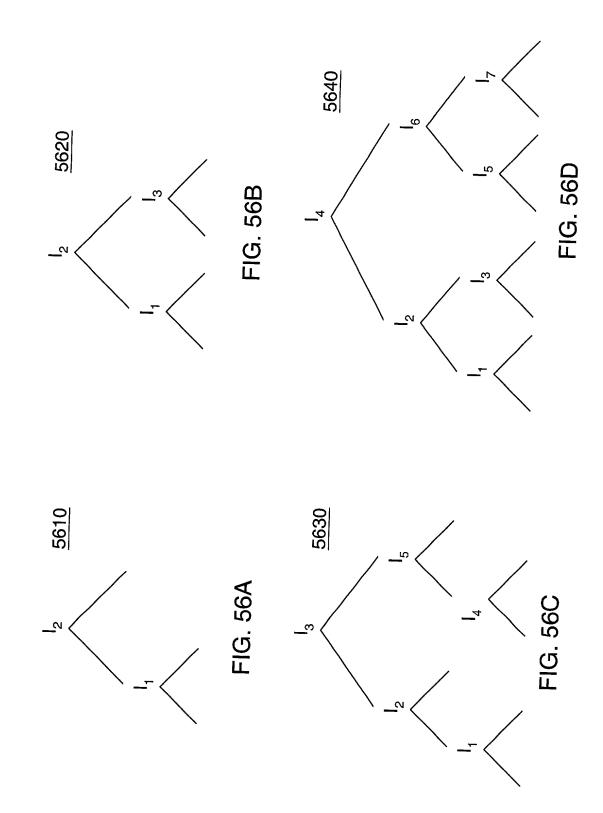
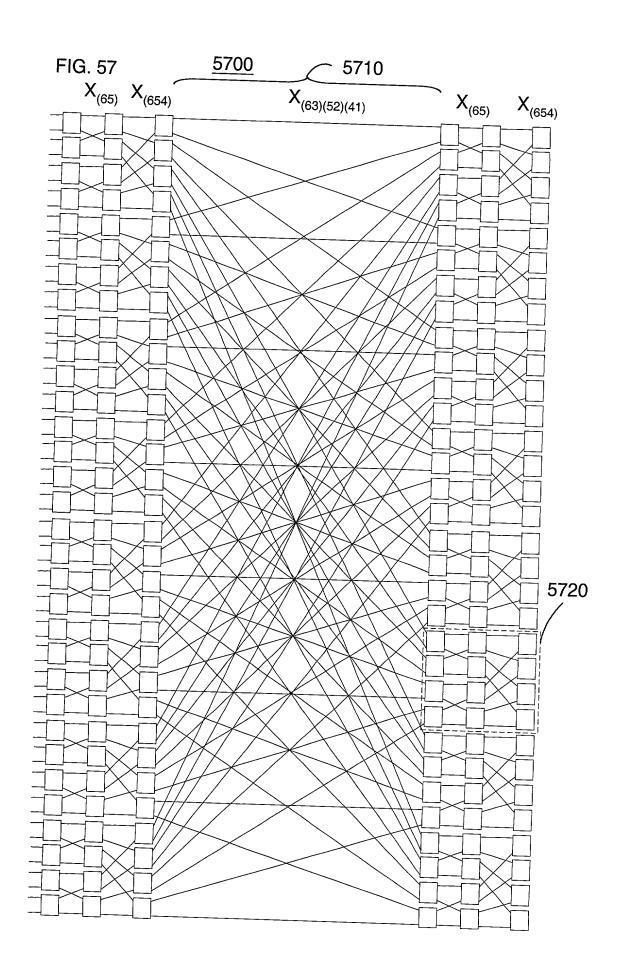
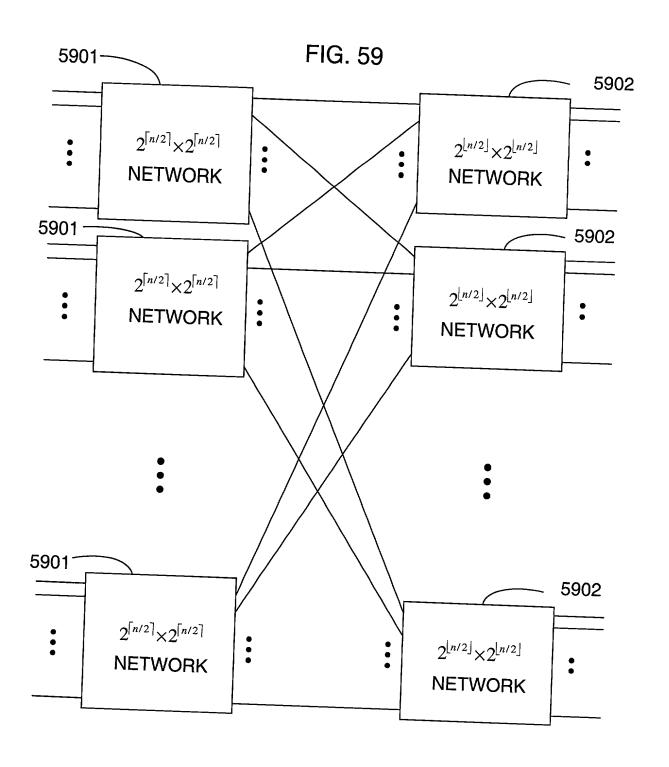


FIG. 55







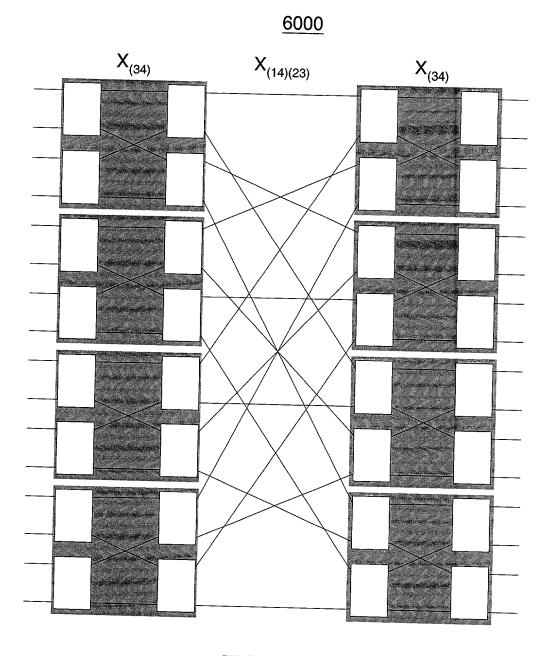
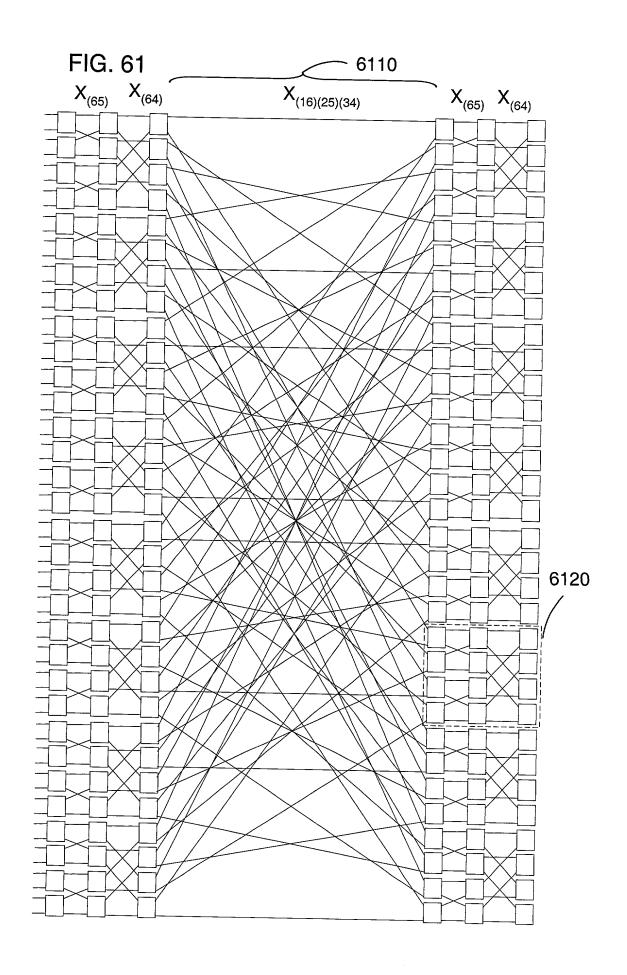


FIG. 60



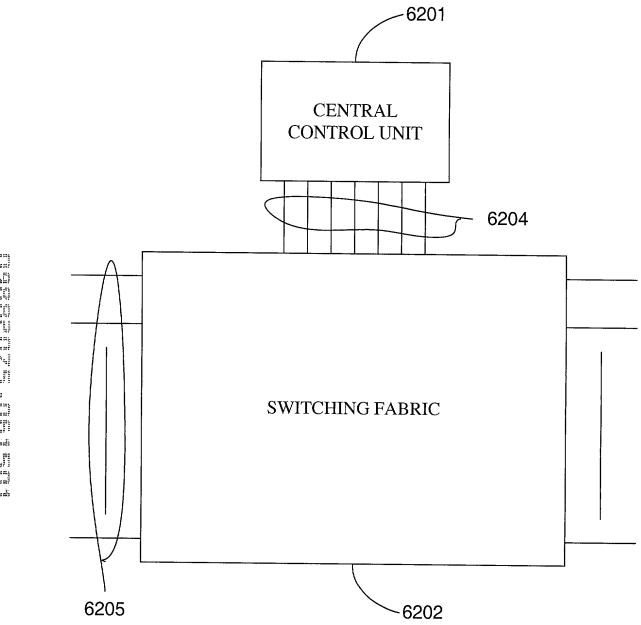


FIG. 62A

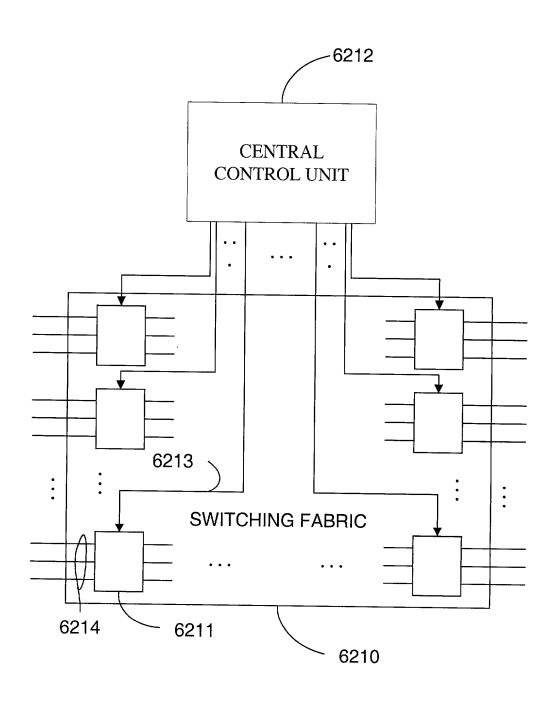
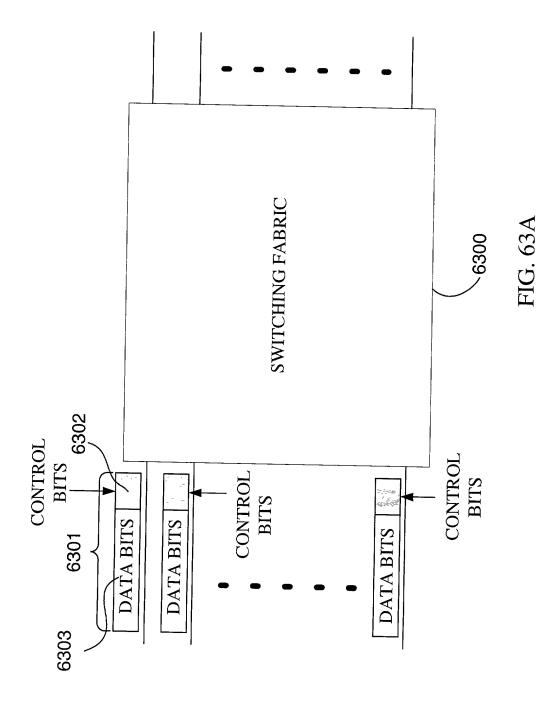


FIG. 62B



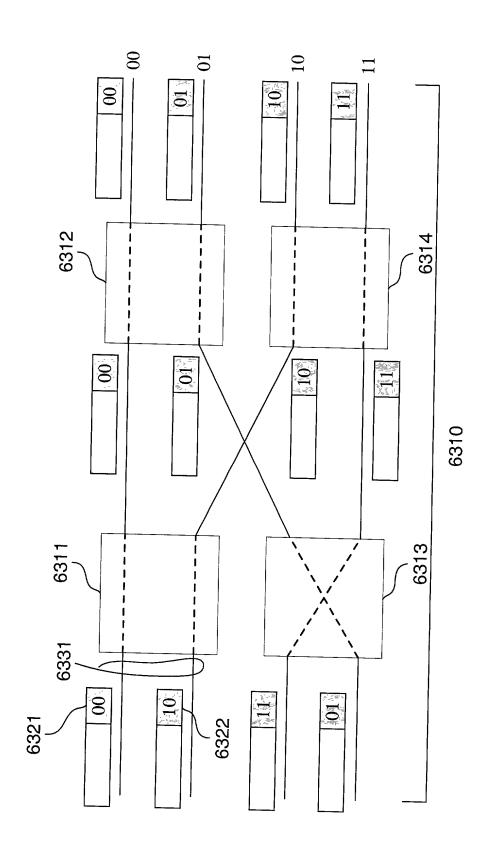


FIG. 63B

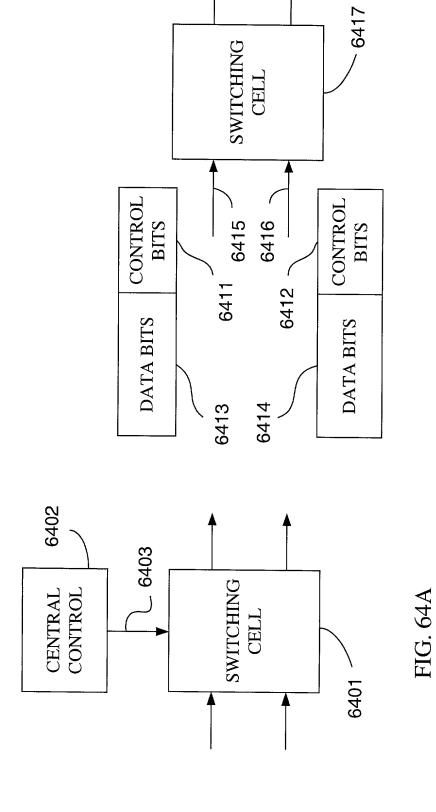
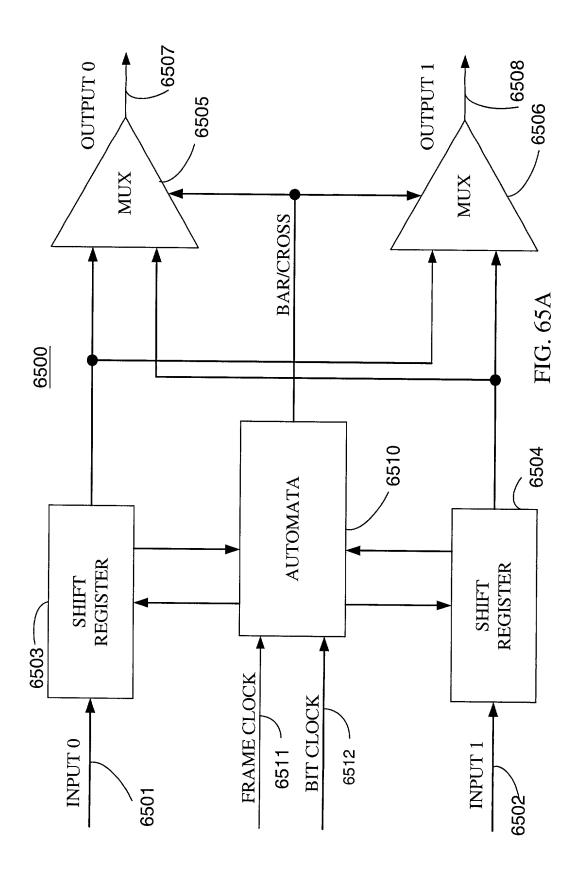


FIG. 64B



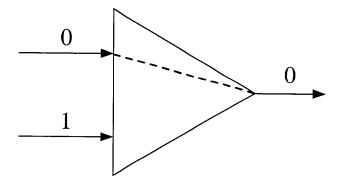


FIG. 65B

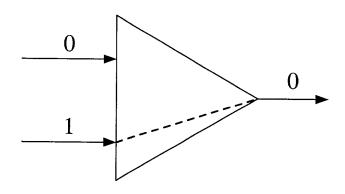


FIG. 65C

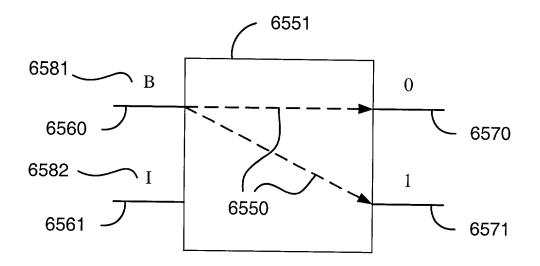


FIG. 65D

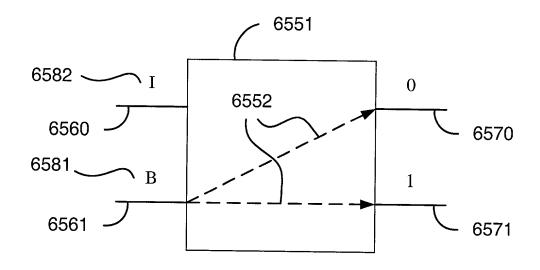


FIG. 65E

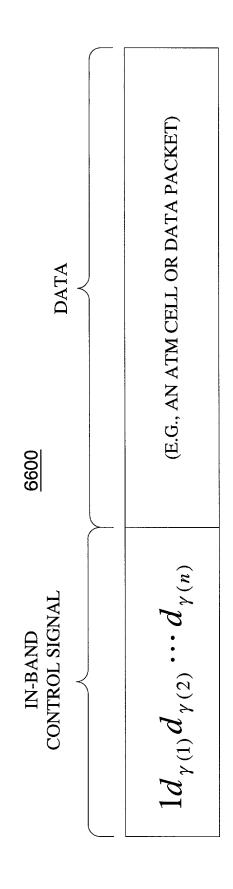


FIG. 66A

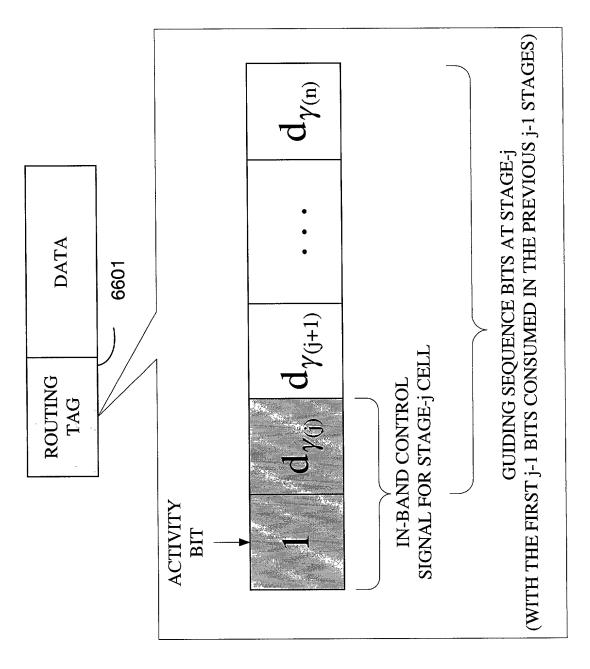


FIG. 66B

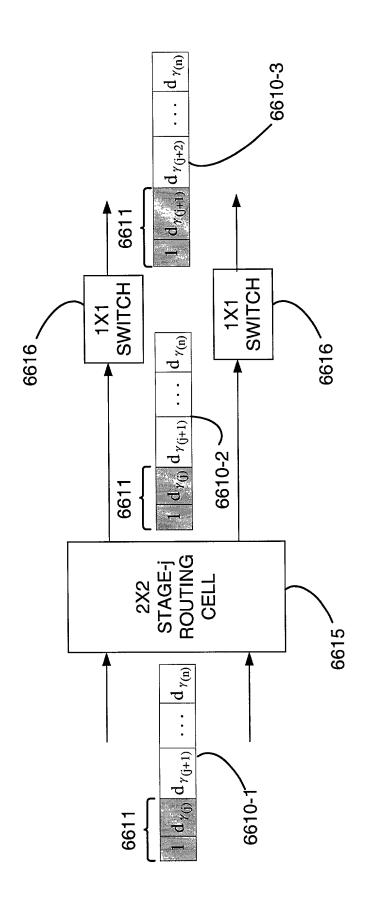
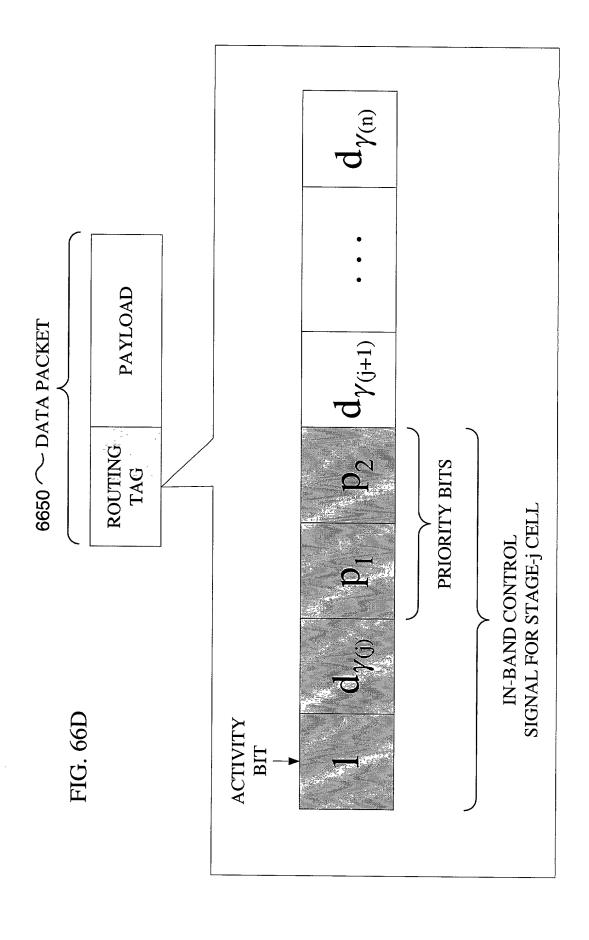
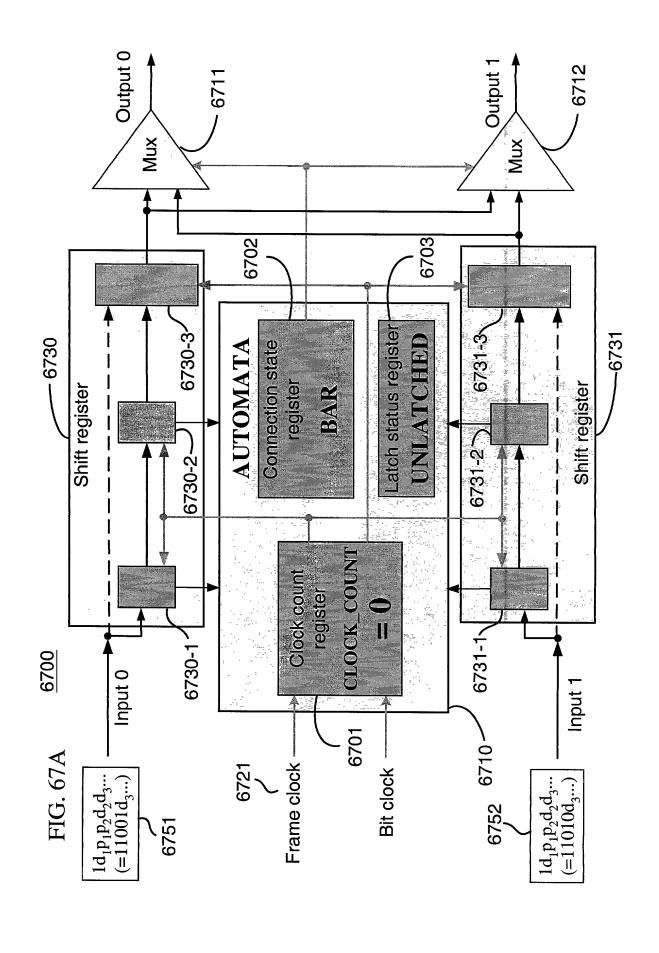
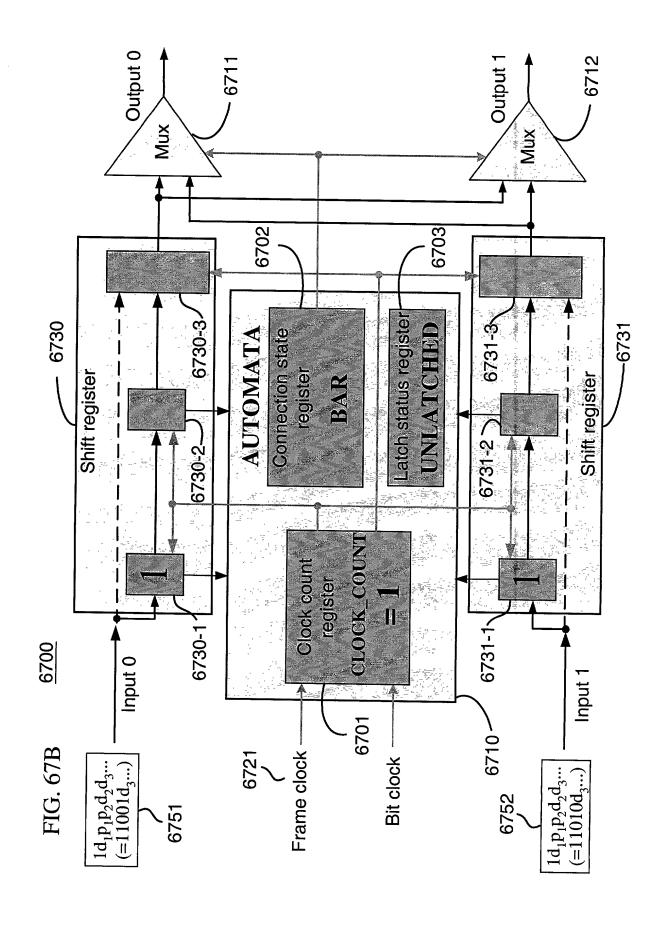
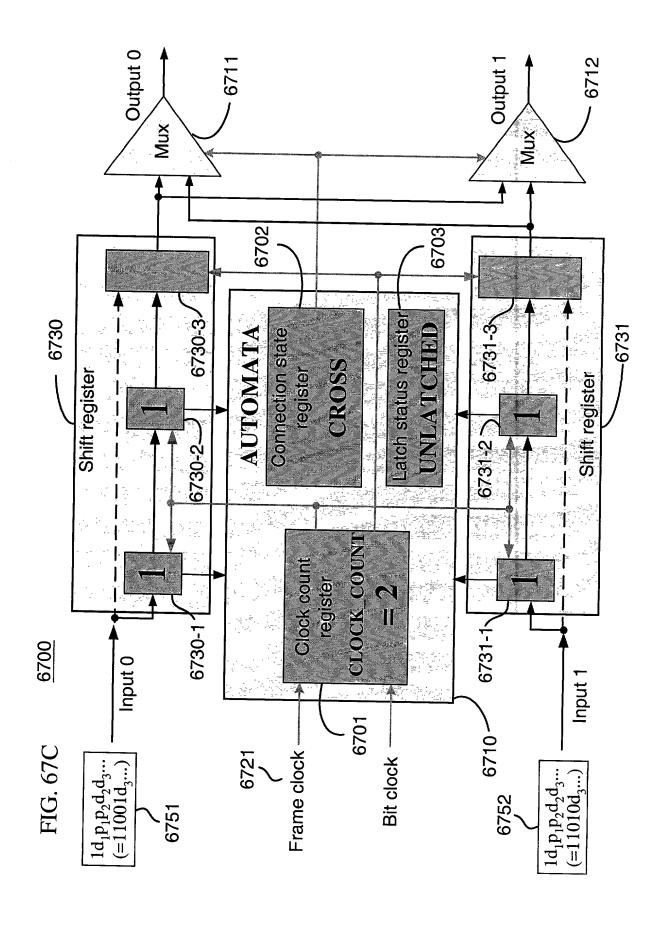


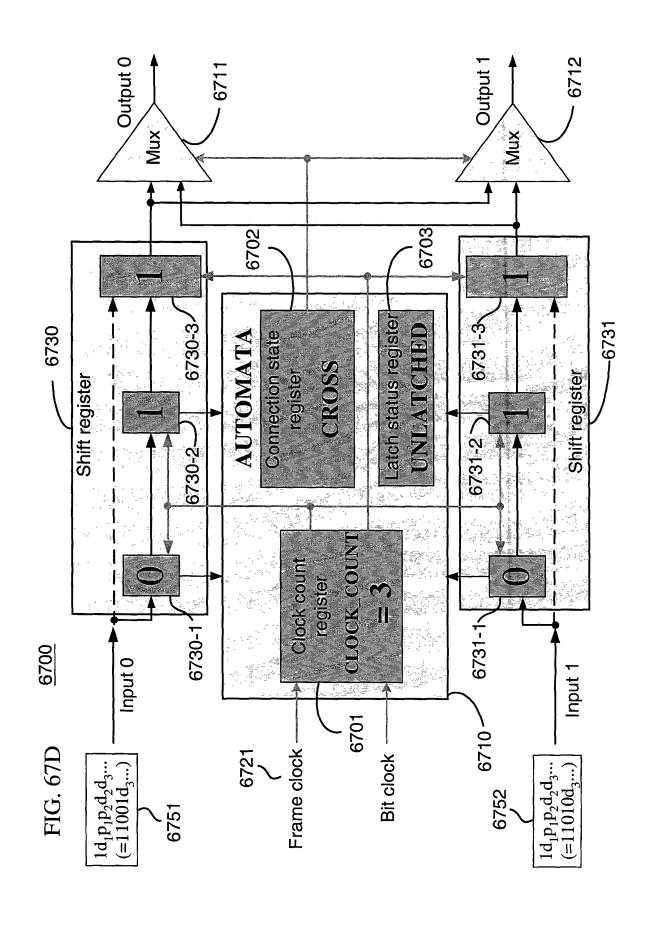
FIG. 66C

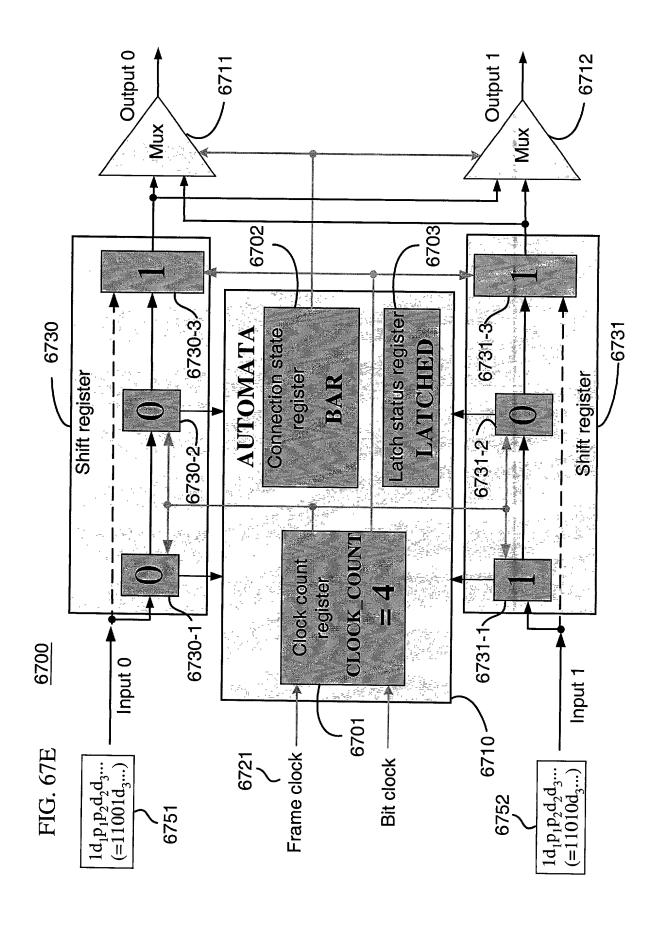


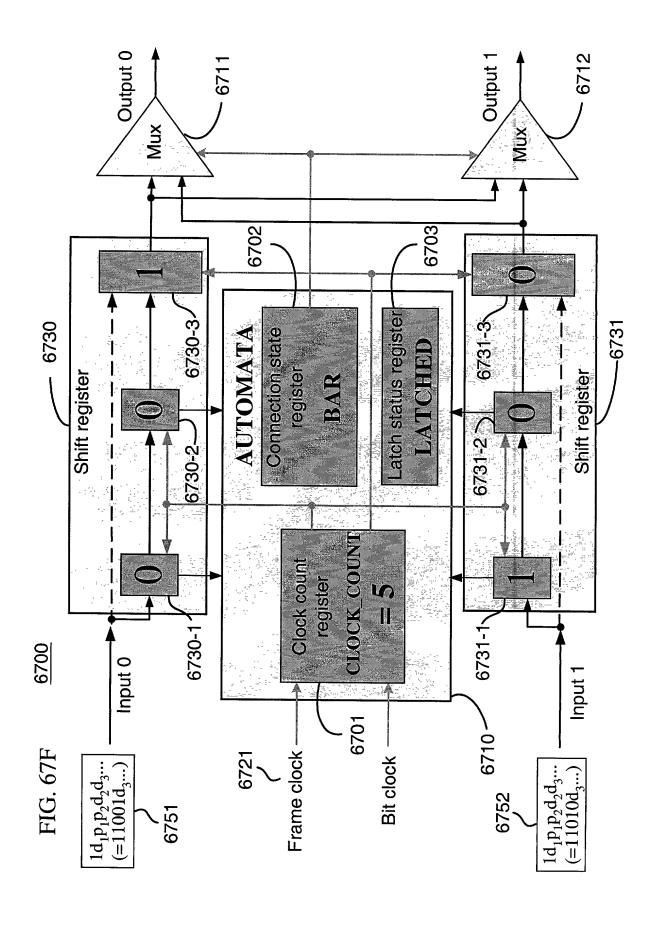












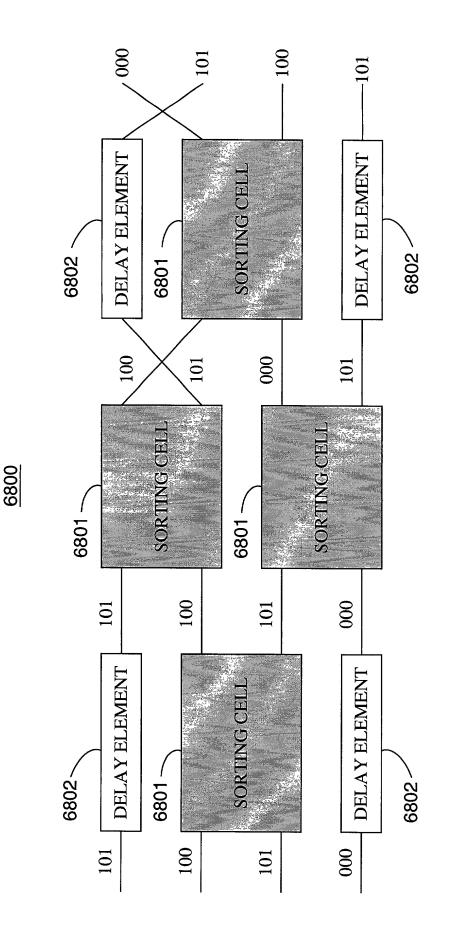
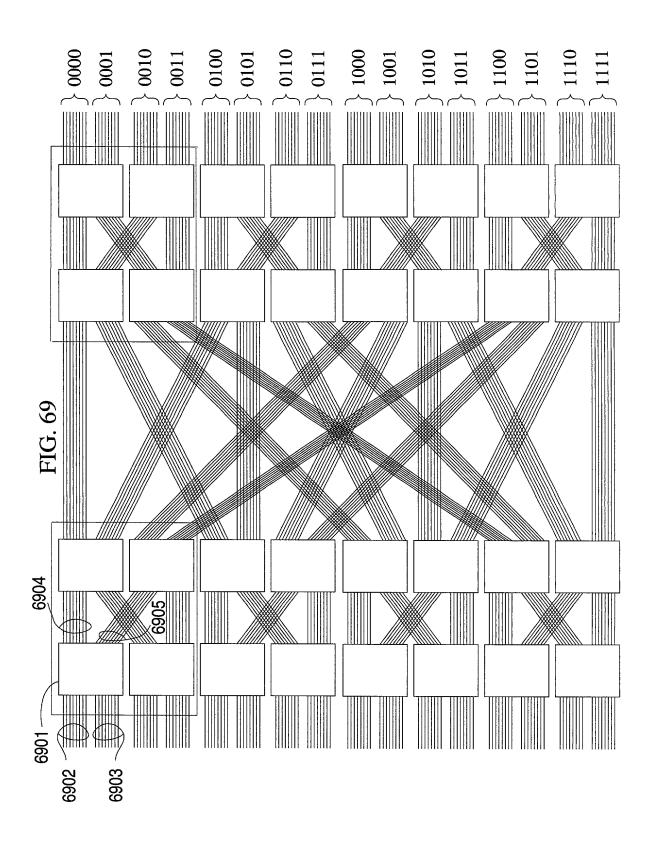
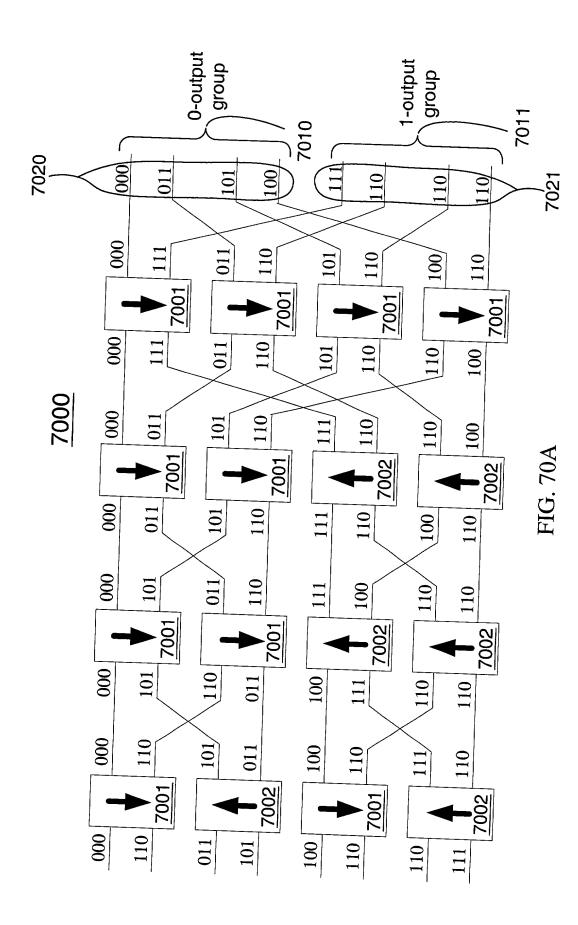
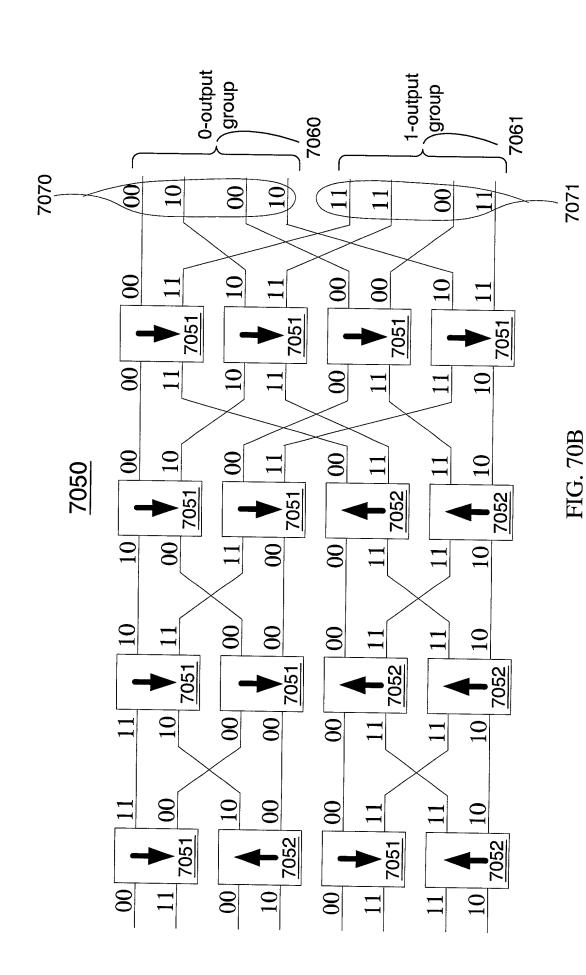


FIG. 68







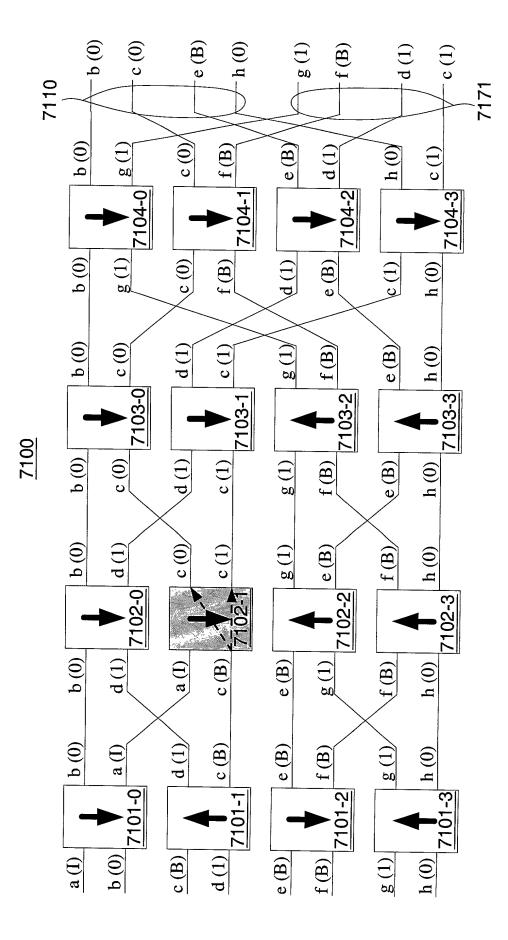


FIG. 71A

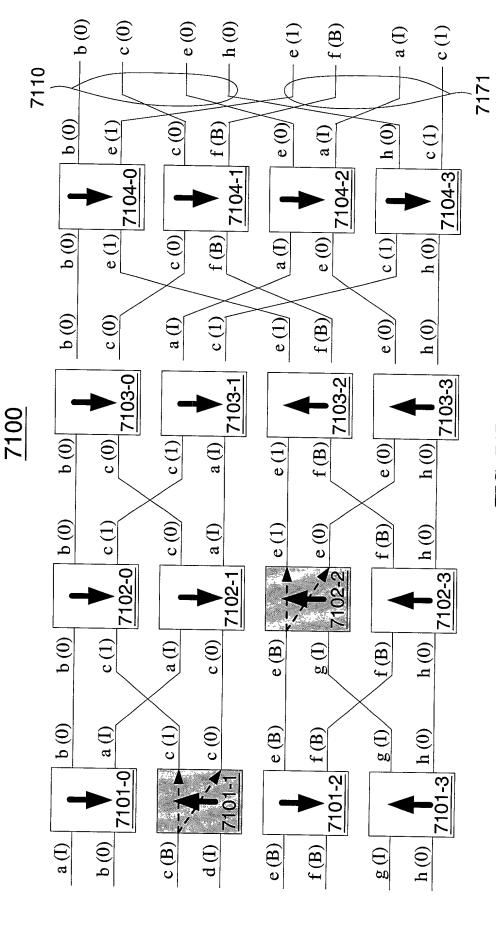


FIG. 71B

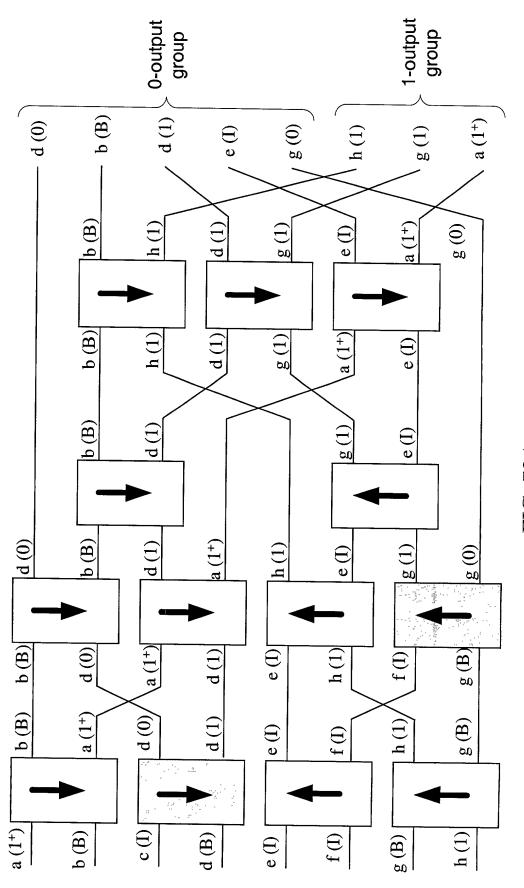


FIG. 72A

